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# JOURNAL

OF THE

# MILITARY SERVICE INSTITUTION

OF THE  
UNITED STATES

VOLUME XX



*AUTHORS ALONE ARE RESPONSIBLE FOR OPINIONS PUBLISHED IN THE JOURNAL*

JAMES C. BUSH, EDITOR.

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*"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."*—SHERMAN.

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Prize Essay.\*

THE PROPER MILITARY INSTRUCTION FOR OUR  
OFFICERS. THE METHOD TO BE EMPLOYED,  
ITS SCOPE AND FULL DEVELOPMENT.

BY CAPTAIN JAMES S. PETTIT, 1ST U. S. INFANTRY.

"The aim of education is the perfection of the individual."—CICERO.

"I call a complete and generous education, that which fits a man to perform justly, skillfully, and magnanimously, all the offices both public and private of peace and war."—MILTON.

"Man is nothing but what education makes of him. Education is an art which must be brought to perfection by the practice of many generations. It is above everything an experimental science."—KANT.

INTRODUCTION.

THE subject is a very comprehensive one and can only be treated broadly in a limited article. Methods of instruction, and aims of education, have occupied the attention of philosophers and pedagogues since the day when language was first written. Many theories have been advanced, many systems tried, but the infinite grinding and sifting of all has not yet evolved one so obviously correct that it must be accepted as the basis of instruction and the key to success. How shall we educate and be educated, is still a perplexing and unanswerable question. Locke, Kant, Montaigne, Pestalozzi, Froebel and Spencer

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\* Board of Award, General E. S. Otis, U. S. A., General Francis A. Walker, U. S. Vols., and Col. L. H. Carpenter, U. S. A.



have originated beautiful systems for single individuals with permanent instructors, but generally impracticable for purposes of the State.

Our modern systems have drawn something from each, but no philosopher has appeared to form a composite pen picture in which the strength of each shall be readily distinguishable to the casual observer, and the whole be a striking illustration of a rational and philosophical system of instruction.

When the science of Psychology becomes better known, we may possibly arrive with more certainty at the true order of studies, and constant experiment and observation will improve methods of instruction, but I doubt if the art of education will ever become sufficiently exact and specific, to enable us to assign definite values to the many subjects taught, and thus arrange a scale from which the student may select such as will give him the greatest benefit in the allotted time.

In our country systems vary from the "elective system with guidance" of Harvard, to the absolutely compulsory ones at the two national academies; and the courses, from 190 at Yale University, to one at West Point. As to their respective merits, there are as many shades of opinion as are possible between these wide limits.

Where an education is desired for a special kind of work, to be pursued as a means of livelihood, such as engineering, electricity, mining, or for the purposes of the State, such as military education, many of the difficulties disappear, but the general question, as to how much time and labor shall be given to the absolutely utilitarian, and how much to accomplishments and general knowledge which broaden the mind and increase the usefulness and happiness of the individual, remains unanswered.

It is plain the subject cannot be treated dogmatically; we must accept the statements of Locke, Montaigne, Spencer, Bain, and other philosophers, with due respect for their great wisdom, and modify the applications of them to our own needs.

The military institutions of a country must take their tone from the civil institutions under which they live. This is particularly applicable to us. Civil institutions are supreme. It is not probable that we shall ever have a large standing army, or that Congressional liberality towards the military establishment will be materially increased in the near future. Congress appropriates what it considers necessary for the support of the army. It is

plainly our duty to make the best possible use of the means given to us. A feasible and just system of instruction must be applicable to existing conditions. Until we have reached the highest possible degree of efficiency under these conditions, we shall have no just claim for increased legislative benefits. I shall therefore base my methods upon the military establishment of to-day.

#### THE OFFICER.

The subject may be approached in many ways. We might attempt to outline the extensive courses of instruction necessary to the perfecting of cavalry, infantry, artillery and staff officers for service in a modern army, but we cannot claim the unusual erudition and experience implied by such a course. He is indeed a rare officer who feels at home in all arms of the line, and he is a very valuable one who is thoroughly equipped theoretically and practically in his own arm.

The most rational method would be, to begin at the source of our present system and follow it through its meanderings, suggesting such changes as we may judge necessary to improve it, and put it in accord with the conditions which confront us.

An examination of the Army Register shows us that nearly 80 per cent. of our company officers are graduates of the Military Academy, and the others have been drawn from civil life and from the ranks.

During the past ten years appointments from civil life have been rare. Unless we have war, or a radical re-organization, we may justly assume that about 85 per cent. of our company officers will come from the Military Academy and 15 per cent. from the ranks. This naturally divides the subject into three periods, viz.:

1. The Military Academy training.
2. Post-graduate schools.
3. Service training.

We may change Milton's definition and call a complete and generous education for an officer, "that which fits him to perform justly, skillfully and magnanimously, all the duties of his position in peace and war."

What are the qualifications of the ideal officer we hope to develop? He must have courage and discipline; he must be highly honorable, and temperate in all things; he must have a sound mind, not necessarily brilliant; a thorough knowledge of his own arm, and a good knowledge of the Art and Science of war;

a robust constitution, and such accomplishments as may serve to place him on an equality with his social peers in any community.

There are natural qualities necessary to a distinguished career in the profession of arms, such as determination, will, fortitude and self-confidence. While these may be cultivated to a slight degree, they are essentially the gifts of heredity, and we need go no further than the War of the Rebellion for ample proof that soldiers are frequently born and rise to eminence through inherent qualities, and without the advantages of previous military instruction.

If we could obtain youths with these natural gifts, and build upon them the other qualifications, the ideal would be reached. There were many men greater than Grant in theoretical knowledge of the art of war and in literary attainments, but none greater in determination, self-confidence, fortitude and magnanimity.

Highest types mark periods in evolution and must not be taken as foundations for systems to be applied to groups or masses; we must build for the average which can be drawn from the brightest and dullest. I shall imply average gifts and abilities.

The officer's instruction must be moral, intellectual and physical. It is impossible to specify the scope of each, for no two individuals are duplicates, and the single individual who is equally capable or equally endowed mentally, morally and physically, can be found only in the very highest type, or in the lowest human wreck. On this I base the claim that the most successful instruction must recognize the individual not as an abstract unit, but as an organized being, with a personality capable of great development on some lines, and susceptible to grave injuries on others.

"There are varieties of gifts, call them if you will, fundamental differences, that make it impossible to train successfully all of a group of boys to the same standard. These differences are partly matters of sheer ability, and partly matters of taste; for if a boy has so great an aversion to a given study that he can never be brought to apply himself to it with some measure of fondness, he is as sure not to succeed as if he were lacking the requisite mental capacity."—President ADAMS, Cornell University.

It remains to be seen how far individual instruction can be carried with a body of youths or men who are being educated for the service of the State.



THE MORAL INSTRUCTION OF THE OFFICER.

General Blondel has said that "all the virtues of the soldier are combined in two—courage and discipline."

This may be true for the man in the ranks, but the officer must go higher. He must be a moral man; a man of honor, of intellect, of justice, of magnanimity and self-denial; "Looking on his officer as a man who can do no wrong, the soldier shall follow as a matter of course."—German.

In the main these qualities are inherited, or are the result of home training, and have been developed when the candidate for a commission presents himself for instruction.

Fortunately most of our young men are found to be honest, manly and courageous, and need only to be told the required standard, to reach it. For them, a course of instruction by lecture on the ethics of their profession, early in the first year of their novitiate, coupled with the example set by their superiors, will suffice to put them on the path which leads to an honorable career.

Under a system of repression and punishment, a youth of low instincts often conceals his true nature, until liberty throws off the mask, and he disgraces himself and the service.

Moral instruction cannot be made efficacious by a purely compulsory system. Liberty is essential to a growth that must be able to withstand the buffetings of life's storms. Restraint whets the appetite for forbidden things. Liberty divulges character and exposes its strength or weakness. The cadet is taught that honor is the soldier's priceless treasure. The standard is high, yet the cadet is not trusted alone across the line marking "cadet limits." It seems as though we were afraid to trust him with his own conscience for a few brief hours. Suddenly all restraint is removed, a new world is opened to him. The strong gain in strength; the weak go to the wall. We want to discover the weak before the Government expends \$30,000 apiece on their education, and before they get an opportunity to disgrace our uniform. The cadet should have more liberty during the few hours granted him for recreation.

Scharnhorst wrote to his king: "We have begun to think more of the science of war than of military virtues, but this has ever been the ruin of nations." The military virtues are courage, obedience, loyalty, honesty and zeal. When these qualities grow weak in the people, the nation must indeed be near the hour of dissolution.

The moral instruction of the officer is in the hands of his comrades and his superiors. The young officer is greatly influenced by the moral tone of his regiment. If it is high, he will grow up to it; if it is low, he is (unconsciously, perhaps) brought down. It is very essential that he be started on the right road and that the first leanings towards vicious habits and indolence be promptly checked by kindly counsel; if this fails, more stringent measures should be adopted. Idleness was for many years the curse of the army. A healthy mind is energetic, and unless this energy is directed into useful channels, it runs to waste. There has been great improvement in the past decade, but the road is still open. Systematic daily work occupying at least half of the working hours of the day, will do much towards maintaining military virtues where they already exist, and towards stimulating them where they are weak. I do not believe in useless work for work's sake. I hope to suggest a course of training which shall contain plenty of profitable and interesting employment.

It is difficult if not impossible to construct a satisfactory course of instruction in morals for young men who are removed from home influences. It is possible to give to young men who are being educated to be "officers and gentlemen" sound instruction in the ethics of their profession. This should be done by lectures, to be given by the commandant of cadets. They should be reinforced by the example\* set by all officers with whom cadets are brought in contact.

"Courage springs from pride, self-esteem, force of will; it is often a conquest of native weakness in the discharge of duty, and once attained can rarely be overcome." Courage is not the absence of fear but the power to overcome it. Bravery is inherited. Courage is of higher quality and can be cultivated by stimulating professional pride, self-respect and manliness; by honoring the flag, and by keeping before the student a knowledge of the brave deeds of his ancestors.

#### DISCIPLINE.

"The object of discipline is to strengthen the character for the purposes of morality."—HERBART.

"By discipline the Germans mean all the military virtues; the qualities of the will and heart and not merely those of the intellect."—FOUILLÉ.

\* Example exercises more beneficial action than written laws and words.—DRAGOMIROV.

For the officer, discipline is not merely a material thing, to be shown by the simple observance of a great many set rules and prescribed forms of action. It is a moral quality, a condition of heart which leads him unhesitatingly to his duty under all circumstances, without hope of reward or fear of punishment, save in the inner satisfaction he feels when he has done his best. The German definition is not too comprehensive for the officer. He should possess all the military virtues.

Discipline may be created and maintained in four ways :

1. By creating in the heart a spirit of devotion to the cause.
2. By instruction.
3. By rewards.
4. By punishment.

The third and fourth methods should never be necessary in the instruction of the officer. Starting with the second method we must reach the first. There is a sentiment growing in the minds of the best military thinkers of the day "that habit and intelligence, fear of punishment and hope of reward are no longer sufficient to persuade the soldier to face the danger he will meet in a modern battle. He must be made to feel that the general's business is his as well ; he must be animated by the same feeling and worked on by the same impulses."—HOENIG.

If this is true for the man in the ranks, how strongly it must be emphasized for the officer. The psychological features of training in discipline must be recognized. Mere mechanical training and habit will not suffice. Modern discipline is not satisfied with mere lip service and perfunctory obedience. Loyalty, zeal, enthusiasm in assisting the commander, and a determined will to conquer all difficulties, are necessary attributes of a thoroughly disciplined officer in a modern army. The instruction of the young officer, in discipline, should begin the moment he joins the service. We occasionally hear officers of rank complain that the young officers who join from the Academy are not as well-disciplined as they used to be. I do not agree with them. The discipline (of its kind) at the Academy is as good as it ever has been. The methods have not changed materially in the past twenty-five years. The trouble is in the service. These young men are not properly started. There is too much familiarity between the different grades. There is no uniformity of treatment or work in companies in the same garrison. The Academy discipline is discipline for boys during a formative period. It is



only a beginning, a foundation to build upon. It has but few of the elements of that higher discipline of which we have already spoken. Based on the hard, merciless system of Frederick, it makes but little impression on the heart or intellect, does not inspire a love of duty, gives rewards and punishments for the observance or non-observance of a host of petty regulations and orders, frequently without fully ascertaining the intent or spirit of the offender, which is the thing we desire to influence and correct.

Boys of seventeen and eighteen are punished as though they were men. A man's standard of work and duty is exacted, but they are allowed only the individuality of children.\* It arouses antagonisms in the heart of the student which makes successful instruction impossible.

"Authority is composed of three elements: 1. Affection and moral respect. 2. The habit of submission,—a habit born of respect. 3. Fear."—GUYAU.

The first is the most effective and lasting, and the one to be cultivated above all others.

"Of all the changes taking place in education, the most significant is the growing desire to make the acquirement of knowledge pleasurable rather than painful. As long as the acquisition of knowledge is rendered habitually repugnant, so long will there be a prevailing tendency to discontinue it when free from the coercion of parents and masters. And when it has been rendered habitually gratifying, then will there be a tendency to continue without superintendence, that same self-culture carried on under superintendence. These results are inevitable."—HERBERT SPENCER.

This is a cardinal point upon which all educators agree. I dwell upon it because of its importance in the instruction of the soldier, whether he be officer or enlisted man.

There is no doubt but our method of instruction in discipline does arouse sentiments of repugnance and injustice, and create a prevailing tendency to discontinue it when relieved from coercion. Instruction in discipline should be theoretical as well as practical. The commandant of cadets should meet the fourth class in the lecture-room as soon as convenient, and give them an address, clearly defining their position towards their country, their chosen

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\* "In order that there shall be responsibility there must be liberty: responsibility rests upon liberty, and on it alone."—JULES SIMON.

profession and their instructors, whose comrades they are ultimately to be. Their duty to each should be explained in an earnest, kindly manner; they should be told that they are on trial to determine their fitness for the honorable and responsible career of an officer in our army; that every assistance will be given to them in their efforts to learn the duties and obligations of their profession; that the first duty of a soldier is obedience, not from fear, but from a love of duty and a spirit of loyalty to his superiors. He should strive to arouse their enthusiasm for their chosen profession, and to impress upon them that a soldier's career can be read in his official record, and his character in the esteem of his comrades.

A series of talks or lectures on discipline should be given each year. No course at the Academy equals this in importance; none leaves so lasting an impression on the mind and character of the student.

An English authority writing of Woolwich some years ago said, "Boys of 16 and 17 years of age need much personal supervision to form their characters, which young officers very often appointed without any sufficient knowledge of their tempers and habits cannot be expected to bestow. Such officers may indeed be able to superintend drill, but not moral teaching. Rarely do they draw cadets toward them, but rather repel them by a harsh and dictatorial manner."—Glieg's Essay on Military Education.

The Academy has at times been open to similar criticism. The instruction in discipline should be intrusted to officers of well-known disposition and ability.

It would be a safe rule to detail captains only to the command of cadet companies. What higher duty can there be in time of peace than the instruction of those who are to command in war? Having obtained men of the desired character and ability, they should be given control of the interior administration and discipline of their companies. By association and friendly intercourse with the students under them, they would learn something of the individuality of each; they could assist the weak by kindly counsel; the reasons for repression and discipline could be made intelligible to all those concerned. The moral nature of true discipline can be imparted only by individual instruction.

Class standing in what is termed "discipline" should be abolished. It is misleading and is not a fair indication of the results of instruction in discipline. It is a system of rewards and

punishments for behavior. Discipline for the officer cannot be crowded into such narrow limits. Neatness and order in person and in quarters are desirable and should be taught in a disciplinary way, but should not be paraded as the essential elements of discipline.

“Discipline must break the contrary and passive will, but only by exciting the positive and active one.”—ARCHDUKE JEAN SALVATOR.

Drill and guard duty when performed under rigid conditions are excellent aids to instruction in discipline.\*

It is doubtful if any improvement can be suggested in the disciplinary methods now in force at the Academy in all practical military work.

The officer appointed from civil life or from the ranks must be instructed in discipline by his captain and his post commander. The captain's influence over a young officer is very great. He will be a follower and will base his line of action upon the example set by his captain. It is therefore very important that the captain shall at all times be loyal, obedient, punctual and courteous. He must stimulate professional zeal if it is lacking. Industry is a military virtue. He must suppress all attempts at familiarity. Discipline goes out at the back door when familiarity enters at the front.

People who have Liberty and Equality for watchwords cannot be disciplined by methods common to monarchical governments, where caste is well defined, and respect for social superiors is the inheritance of long years of vassalage. The United States volunteer regards first, the power of law; second, ability, strength and dignity of character; the second becomes effective through a judicious application of the first.

Discipline forbids social intercourse between the soldier and his officer; it also demands that officers shall at all times exact the respect and courtesy due to their rank. If they conduct themselves so as to merit this respect and courtesy personally, as well as officially, the quality of discipline is improved.

The Regular Army is the model for the National Guard; it must be made as perfect as possible.

During his first years of service, the young officer must be guided by strong and skillful hands. His instruction in discipline should be conducted on the assumption that he is ignorant of the

\* “Acts produce habits, and habits produce acts.”—ARISTOTLE.

meaning and methods of true discipline. It is not wise to assume that he is proficient in any branch of professional training.

#### PHYSICAL INSTRUCTION.

The present system of physical instruction at the Academy leaves but little to be desired. The cadet must be physically sound at the beginning and end of the course. Consequently the classes represent a searching physical selection from many hundreds of young men. Four years of regular diet, sleep, and exercise assist nature in her noble work. The gymnastic training (which should be continued through another year), coupled with athletic sports in moderation, enables the two National Academies to turn out groups of young men physically superior to those of other institutions. The introduction of foot-ball and athletic contests has done much to increase interest in athletics and physical culture throughout the army.

The most beneficial exercise is that which pleasantly engages the mind and body at the same time. A few more hours devoted to athletic games would still further improve our young men physically and mentally.

Descartes laid down the following rules for his guidance, and claimed that he followed them:—

“1. Never allot more than a few hours per day to thought which occupies the imagination—(concrete science and arts).

“2. Give only a few hours per year to work requiring the understanding alone—(mathematics and physics).

“3. Give all the rest of the time to relaxation for the senses, rest for the mind and exercise for the body.”

Liebnitz said, “So far from our mental powers being sharpened by excess of study, on the contrary, they are blunted.”

Sixty hours per week for study and recitation, from September first until June first, is too much for the best development of mind and body.

Our young officers join the service with good constitutions. Plenty of out-door exercise during the drill season and freedom from vicious habits will preserve them for many years of service.

#### INTELLECTUAL INSTRUCTION.

*The Military Academy*.\*—The curriculum of an old estab-

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\* A sound formal education is the indispensable prerequisite of a thorough military professional education.—Order of Teaching. War College, Berlin.



lished educational institution is the result of years of earnest labor and devotion, based on the accumulated knowledge and experience of all past time, and careful judgment as to the needs of present and future generations.

Buildings and an assemblage of instructors and pupils do not alone signify a great university. Traditions, customs, associations, long lists of distinguished alumni, give to life at old institutions an influence and interest not found in fledgelings. Educational statistics are of little value save to indicate that a certain number of instructors and pupils have passed so many days in school. A long catalogue of courses of instruction does not guarantee an education.

No institution can justly pronounce itself the best. Each pupil chooses the one he considers best adapted to his means and wants.

I have no intention of comparing the Military Academy with other institutions so far as its course of study is concerned. It has a definite and unvarying object, viz.: to procure from the young men of our country, those best fitted morally, mentally and physically to serve as officers of its army. As 85 per cent. of our officers are to lay the foundations of their future careers within its walls, its methods are of vital importance to the subject we are discussing. Its influence is impressive and lasting. Can it be improved?

The Academy is nearly one hundred years old; a century full of honors and usefulness. The present course is the result of the labors of men second to none in ability and devotion. The main fault of the Academy is its too rigid conservatism which retards its progress towards modern methods of education. Methods of instruction and aims in education have not been silent watchers of the world's great progress. They have not only joined the procession, they have increased its rate of motion.

The various departments of instruction were established by Acts of Congress and they can be changed only by the same power. The faculty is therefore denied that freedom of arrangement and power to experiment, so useful in other institutions. Radical changes even if desirable would be difficult if not impossible. I shall therefore confine my suggestions to some changes which in my humble judgment are rational, feasible and necessary to secure better results and more nearly meet the demands of the service.

Most philosophers agree as to the aims and object of education. "To encourage independence of thought rather than to amass a quantity of learning; to direct study rather to the strengthening of the powers of the mind than to acquiring the furniture of crudities," is the key-note of Locke's advice in "The Conduct of the Understanding."

"The beginning of all knowledge is observation, the goal of it, clear comprehension."—PESTALOZZI.

"The main duty of instruction is to give the mind a framework whereon to group the facts and ideas given it in the sequel by reading and experience."—GUGAU.

"In estimating the value of a branch of study, we must consider, not merely what it gives us but what through engrossment of our time it deprives us of."—BAIN.

We may divide instruction into two kinds:

1. That which has for its object mental training or discipline.

2. That devoted to the imparting of knowledge. The knowledge may be utilitarian, or it may be regarded in the light of an accomplishment. Kant's position seems unassailable, "to encourage independence of thought," and "to direct study to the strengthening of the powers of the mind" are certainly the fundamental ideas in modern education.

In a professional or technical school such as the Military Academy, the faculty has constantly before it the problem of dividing the time justly between subjects taught for training and those necessary to give the student a good ground knowledge of his profession.

A proper system of post-graduate instruction would simplify the problem. We have such schools for the engineers and the artillery, and all officers of these arms are required to attend them. We have excellent service schools for the infantry and cavalry, but it has not been made possible for all officers of those arms to receive the benefits of instruction at them, and the Academy must continue to supply the deficiency as well as it can.

The curriculum of the Academy was modelled upon the military schools of France. It is consequently largely given up to mathematics and the physical sciences. Gleig says "the despotic governments will foster from the outset the exclusive study of mathematics and the physical sciences, not only because they are necessary to an extensive acquaintance with the art of war, but

because addiction to such studies has a direct tendency to withdraw men's minds from the consideration of political questions."

The constitutional government not undervaluing the importance of scientific knowledge will be desirous of adding to it other acquirements which may be more interwoven perhaps with its civil than its military institutions, but which are not on that account the less important in its eyes. Shall we follow the despotic or the constitutional government?

*Mathematics.*—We have for many years devoted thirty hours per week throughout the course to the study of and the recitation in mathematics; pure mathematics for the first two years, and mechanics, astronomy, sound, light, engineering and ballistics the last two. Are we justified in giving such unusual time and importance to mathematics either on the ground of training or utility or both?

Doctor Holmes gives praise to the man "who has all the talents, *plus mathematics*." [The italics are his.]

"Mathematics are so often thought by those who are ignorant of them to be the key to all reasoning, and to be the perfection of training. It is worth while to remember that after all they are only compendious and very limited methods of applying deductive reasoning. They no more teach reasoning than traveling by railway fits a man for exploring in Africa."—WILSON, M.A., F.G.S., F.R.A.S.

"Mathematics does not teach us how to observe, how to generalize, how to classify. Too exclusive devotion to it gives a wrong bias of mind respecting truth generally, and historically it has introduced serious errors into philosophy and general thinking."—BAIN.

I seriously doubt if the evidence for and against justifies our course.

In our technical schools six hours per week is the usual time devoted to recitations in mathematics. It would be difficult to ascertain the number of hours' study preparatory to recitation. Fifteen hours would, I am told by excellent authority, be a high average. Does preparation for military service require nine hours more per week for a longer period? From a utilitarian point of view, most emphatically no! Infantry and cavalry officers have but little use for mathematics. They are usually selected from that part of the class which shows but little ability or fondness for them; consequently the benefits they receive

from the study of them are not commensurate with the time devoted to them. It is also difficult to see why the artillerist and military engineer need so much more instruction in mathematics than specialists in other technical schools.

Is it the best training for the officer? It is purely deductive and is dogmatic and narrowing. It reasons from absolute rules and axioms. The reasoning of the officer in time of war is generally based on very uncertain premises. It does not awaken an interest in original investigation. It teaches one to regard quantity rather than quality. We must also take Bain's advice to heart and reflect seriously on "what we deprive ourselves of by this engrossment of our time." I consider twenty-one hours per week amply sufficient for instruction in mathematics, admitting that we must still pull the lower part of the class up to an unwelcome feast to do justice to the engineers and artillery. Certainly three and one-half hours per day, six days in a week, and for nine months of the year, ought to meet the requirements both for training and utility.

#### SCIENCE.

Mill speaks of "the indispensable necessity of scientific instruction, for it is recommended by every consideration which pleads for any high order of education at all. Reasoning and observation have been carried to their greatest known perfection in the physical sciences."

"For discipline as well as for guidance, science is of chiefest value."—HERBERT SPENCER.

"Science is the most perfect embodiment of truth. More than anything else does it impress the mind with the nature of evidence."—BAIN.

The unanimity of opinion among philosophers and educators as to the value and great importance of science both for training and utility makes discussion unnecessary. It must be given a prominent place in all schools. It is especially demanded in a school which is to fit men to perform the varied duties which fall to the lot of an officer in our army.

There are various opinions as to how science should be taught to make it most attractive and beneficial to the mind. Unfortunately time does not permit much practical work. Experimental and original work has to be omitted; the instruction must therefore be from books; not the most satisfactory method, but



necessary. Mechanics, chemistry, electricity, mineralogy, geology, heat, light, sound, and astronomy are essential in a comprehensive course of science. If the instruction is made pleasurable and an interest developed which will cause the student to continue his studies "when superintendence is removed," and to truthfully observe and reason upon those things which constantly surround him, we may say it has accomplished its object.

The question as to the proper division of time between theoretical and practical instruction is perplexing and does not admit of an exact solution. We have extremes of each. Some attention must be given to the student's capacity to digest and assimilate knowledge; otherwise, instruction becomes a mere cramming process, hurtful to the recipient. The capacity of every human mind is limited, and when that limit has been reached in any given subject new material can gain lodgment only by displacing other (and perhaps more useful) knowledge.

It is not the purpose of the Academy to educate specialists in any branch of science or literature. Consequently, a good strong foundation in theory is sufficient. If practical work can be added without detracting from the thoroughness of the theoretical, it will be interesting to a great many students, will possibly create a fondness for original investigation, and improve the powers of observation and discrimination; certainly, very valuable qualities for the officer. Very great care and wisdom must be used in determining the quantity and quality of the practical work, glibly talked about, but little understood by critics of the Academy. We must "make haste slowly." The able men who have the matter in charge are fully competent to arrange it for our best interests.

Drawing is essential in a military school. Every officer should be able to make a rapid field sketch. It need not be a work of art, but it should be neat, accurate and easily read. He should also be able to make a neat and accurate mechanical drawing. If time can be found for instruction in free hand drawing and landscape sketching, it will be a great advantage. It is a refining and graceful accomplishment, and nothing teaches one to carefully observe the ground so much as an apprenticeship to the landscape artist.

"For the purposes of intellectual and artistic education, it needs to be supplemented by drawing from nature, else it fails to exercise its peculiar powers as a stimulus to observation, to

purity of taste, and to appreciation of natural beauty."—THOMAS HILL.

#### LANGUAGES.

What languages shall we teach? Evidently our own first and most thoroughly. The nine hours per week that I have suggested as being necessary for mathematics, might with great profit be added to the time for study of the English language and literature. We have fallen behind other institutions in this respect. It appeals to us from two points of view,—utility and accomplishment. It is absolutely essential to a liberal education. Language and thought go together, a study of the best thought begets power to think, and power to think precedes power to act. The officer needs power to think and act quickly and correctly, and capacity to express his thoughts clearly, verbally, and on paper.

The entrance examination in English (fixed by law) has a discouragingly low range. We are forced to start at a much lower standard than that accepted at any other college or technical school. As a change in the law is barely a remote possibility, we have much to make up to place our product on an equality with that of sister institutions.

We should teach grammar, rhetoric, English composition and literature. The time deducted from mathematics could very profitably be given to the department of languages. An officer has much time for reading and self-improvement. It is our duty to conduct his early instruction, which lasts but four years, so that his self-instruction which is to continue throughout his years of service, shall be both profitable and pleasant, and round him up to the stature of the full man.

Contact with men of liberal education teaches us not how much we have learned but what we have been deprived of by an engrossing apprenticeship to mathematics.

For many years each Board of Visitors has criticised the cadets' use of English. Comparison frequently demonstrates that their English is quite as good as that found in the report of the board. Grant, Sherman, Jefferson Davis, Captain King, Professor Hardy, and many others, have written very readable English, and the many scientific works written by graduates need not fear comparison with those produced by graduates of other institutions.

Space does not permit further argument for an increase of time for the study of English. With small classes and a rigid

system of work, all students can be taught to write and speak good English, and be given sufficient knowledge of their mother tongue to direct further research into its vast and ever varied domain.

What other languages shall we teach?

It is the general opinion among educators not exclusively devoted to the classics, that the study of foreign languages can be approved only on the ground of utility. "That their main if not their sole justification is, that we mean to use them as languages, to receive and impart knowledge by their means."—BAIN.

This view appeals to us for the following reasons: 1. The course is now crowded to the full capacity of students. Nothing can be added until something has been subtracted; 2. Our language is being acquired by the entire world with amazing rapidity, and one can travel around the world quite comfortably without knowledge of any language but English.

If we have time for two foreign languages, French and German are evidently the ones to be selected. They are the richest in general literature; are most generally taught in schools at home and abroad, and next to English most prevalent throughout the world. As France and Germany are the two most powerful military nations of the world, their military literature is the most valuable to the student of the art of war, and should be within his reach. It is not necessary nor is it possible to give students a speaking knowledge of these languages in the time we can devote to them, but two years of careful instruction will give a good reading knowledge of them and will suffice on the ground of utility.

To sum up: the first two years of instruction should cover the following subjects; pure mathematics, English grammar, rhetoric, composition and literature, drawing, French and German. The day should be divided as follows; eight hours for sleep, one and one-half hours for meals, nine hours for study and recitation; one half hour for work in the gymnasium; one hour for drill and military exercises and four hours for reading and recreation. Saturday afternoon and Sunday to be added to the time for recreation. This is certainly a fair division of time and labor both for the student and for the Government which has a right to demand his best efforts.

The instruction in English literature should endeavor to encourage students to adopt systematic courses of reading.

The third year must be devoted to the study of science on the lines already laid down. Drawing to be continued, as two years' instructions will be necessary to accomplish our purpose.

Having devoted three years to the study of science and literature, the fourth must be devoted to professional subjects. It has been suggested that the class be divided at the beginning of the last year and separate courses be established, one for the engineers and artillery and one for the infantry and cavalry. This would not be wise. Our military policy demands that our officers be instructed for duty in all arms of the line.

Sheridan was in the infantry when the war opened; Howard was in the ordnance; McPherson was an engineer. If war should come upon us now we should have to increase our cavalry and our field artillery. We should need trained officers for them at once, and would have to draw them from the infantry, as we could fill vacancies in that arm more acceptably. An officer in our army can hardly foresee the nature of his service in time of war; his training must therefore be broad and extensive.

What professional subjects shall we teach; we have only utility to consider?

1. Military and civil engineering; it is essential that all officers be carefully trained in elementary engineering; 2. Constitutional law; (We live under a constitutional government in which military power is subordinate to civil power. The frequent use of the army in suppressing strikes and the consequent conflict between civil and military authority requires that officers be well informed on constitutional law.) 3. Military law; 4. International law; 5. Ordnance and gunnery, ballistics, explosives, and material of war; 6. Military history\*; I deem it of great importance that this interesting and very valuable subject be introduced into the academic course. "It is the most fruitful of all sources of information."—NAPOLEON.

It is the foundation of our art, the basis of our profession.

"The principal object of the study of military art is to perfect the intelligence and the judgment of officers by combining study with the most extensive use of their moral faculties. This object is attained only by using the lessons of experience.

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\* "The lectures upon military history offer the most effective means of teaching war during peace."—Order of Teaching. German.

"They will acquire a high value if the teacher succeeds in bringing into exercise the judgment of his pupils."—*Ibid.*



“The study of military history ought not to be extended to epochs which offer no characteristic bases for the conduct of actual war. They should characterize the military art of the nineteenth century; familiarize officers with the true life of armies in the field; prepare them to keep the head clear and the heart warm in danger; finally, to exalt incessantly the sentiment of patriotism.”—GENERAL DE PEUCKER.

We cannot imagine a subject more interesting or more useful to the young soldier. With very limited time at our disposal we need not go back of Napoleon's time. His campaigns, the War of the Rebellion, the Franco-Prussian and Russo-Turkish wars, will furnish ample material for a one-year course. We can give more time to it in the post graduate courses, but we must do something for those who are not to have the advantages of post-graduate instruction. We can at least teach cadets how to study military history and arouse an interest in it which will cause a continuance of the good work. It is recommended by every reasonable consideration.

7. The art of war to include minor tactics, logistics and strategy. The time could be divided as follows: First term, September to January; daily one and one-half hour recitations, and three and one-half hours for study of the art of war; two hours for study and one for recitation in law, to alternate daily with ordnance throughout the year. Six hours per week, two for recitation and four for study, can be given throughout the year to military history. From the first of November to the middle of March, the climate prevents out-of-door drills; two hours per week of the time usually devoted to drill can be given to lectures. The post-surgeon should have the first two months for lectures on anatomy, physiology and hygiene, sanitation, first aid to the wounded, etc. Sickness is the great destroyer of armies. In the event of war our men will be hastily drawn from the office, the counter and the workshop; unhardened to exposure and fatigue, they quickly succumb to disease, often contracted through lack of knowledge of ordinary sanitary precautions. In the future, even more than in the past, victory will come to the army which can manœuvre the most rapidly. Power to manœuvre means capacity to march, and capacity to march depends upon the physical condition of the men. General de Brack says: “It requires more skill to keep men in condition to fight, than to conduct the fight.”

Three hours per week from the first of January until the drill season opens, should be given to the Department of Tactics, for lectures on minor tactics, discipline and customs of the service.

I have given a summary of what I consider a proper and feasible course of theoretical instruction during four years of academic life. It is impossible to do more and leave space for the more important years to follow. The practical instruction must keep abreast the theoretical. During the first year it must be confined to instruction in the duties of a private in the drill regulations for artillery and infantry, gymnasium work and swimming, under the instruction of the master of the sword. In the second year the student should acquire a knowledge of the duties of corporals and commence his lessons in riding and horsemanship. The importance of the non-commissioned officer on the field of battle has greatly increased. It is demanded that every cadet be thoroughly drilled in all of the various duties of non-commissioned officers. It must not be confined to the few who may be selected to wear chevrons. Rational instruction never loses sight of the object to be attained, which is in this case the equal preparation of all for the duties and responsibilities of commissioned officers. During the third year instruction in the duties of sergeants will be in order, and in the fourth the duties of lieutenants.

Instruction must be progressive and varied; the quantity is not as important as the method and the quality. The reasons for the different schools and movements should be clearly explained. The instructors must remember that they are not simply aiming to perfect drill in order to make a fine showing before distinguished visitors, but are aiming to develop leaders and teachers for our army. To progressive instruction in infantry, cavalry and artillery drill we must add field engineering, bridge building, signalling and target practice. There is also time during the encampment to teach first-class men the elements of foot and mounted reconnaissance, outposts, patrols, advanced and rear guards, and route marches.

The encampment should be devoted to practical work, with a liberal allowance of time for rest and recreation.

We cannot leave the subject of academic instruction without a few words on the method of getting work from cadets.

Effective organization demands that the rank of every officer and man in an army be definitely fixed by law. The law fixes the second lieutenant rank of classmates on their class standing; it

also affects their choice of arm of the service, and consequently their entire future career in the army.

The system of emulation is therefore developed to the highest degree. I am aware that the system is necessary and to a great extent desirable, but it can and should be modified so as to increase the desire for knowledge and weaken the struggle for marks alone. Bain says: "Emulation is the most powerful known stimulant to intellectual application. Its defects are (1) it is an anti-social principle; (2) it is apt to be too energetic; (3) it is limited to a small number; (4) it makes a merit of superior natural gifts." The question is whether a more moderate pitch of excellence, such as befits average faculties, could not be attained without that stimulant.

Most of our large universities have adopted the latter view. Class standing is not a true indication of soldierly ability; the War of the Rebellion demonstrated that in many cases. It is, however, the only practical method of determining the relative capabilities of young men at this period in their lives.

The injury is done by placing before the student his daily marks in each subject. He soon acquires the habit of working for marks alone and of estimating the value of the instruction upon the marks he receives instead of upon the knowledge and the mental discipline. I think the daily marks should not be published and that class-standing should be announced only after the semi-annual examinations. If any members of a class are doing poorly it will be a simple matter for the instructor to warn them that they must improve in their work. We have become so infatuated with the marking idea as to carry it into our post-graduate schools, and we have seen the sad spectacle of a war veteran competing, on a scale of three, with a "youngster" just out of the Academy.

The changes I have suggested in our academic instruction are feasible and from my point of view necessary to bring it up to a higher pitch of excellence, and that it may more nearly fulfill the hopes of its friends and disarm the criticisms of its enemies.

We might institute comparisons with the curricula of foreign military schools. It would not mean much. The entrance conditions are so different, the objects so varied, and the service requirements so extensive, as to give us but little just basis for comparison.

To recapitulate; I have suggested the following changes:

1. A more rational and comprehensive course of instruction in discipline and *morale*.

2. A reduction in the time devoted to mathematics, and a transfer of that time to instruction in English literature, French and German.

3. The introduction of theoretical and practical work in minor tactics.

4. Suppression of the publication of daily marks.

5. Progressive instruction for all cadets in practical military work.

6. The introduction of a course in military history\* in the senior year.

7. A little more leisure time for reading and athletic games, which refresh and stimulate mind and body.

#### POST-GRADUATE INSTRUCTION.

Upon completing the course at the Academy, the young officer should be assigned to a regiment for duty with troops. After two years' service with his regiment he should have an opportunity to attend the special school for his arm of the service. The two years of rest from severe mental exertion will be refreshing and beneficial without destroying the power of application to study.

The young officer will have had some experience in his chosen arm and should welcome the opportunity to perfect his knowledge of his profession; he will be on terms of equality, possibly of friendship with his instructor, he will not be subjected to useless and galling restraints; he will be ambitious to avail himself of every opportunity for advancement, and he has a good strong academic training as a foundation; furthermore, he will have arrived at man's estate, and a serious view of his duties and of the possibilities in which he must be prepared to take a part. He will no longer be an unwilling student held to his tasks by force; the development of the *morale* of the officer (the most powerful factor in war)† has already begun; the instructors have

\* "There does not exist and never has existed \* \* \* an 'art of war' which was something other than the methodic study of military history."—COL. MAURICE. Enc. Britannica.

† "Moral force is three-fourths in military affairs; other forces one-fourth."—NAPOLEON.

"No! the secret of victory does not reside in instruments of destruction. It is a power old as the world, yet always young, more redoubtable than arms; apt to give



but to direct the growth of powers and qualities already in evidence.

These are ideal conditions. If great results are not attained the fault must lie in erroneous methods of instruction or in the incompetency of instructors.

There are, unfortunately, some weaklings devoid of a just appreciation of the obligations, dignity and honor conferred on them by a commission, who fritter away the golden opportunities. They should be warned by the War Department that lack of interest and proper zeal may lead to their dismissal from a service to which they bring no credit.

A generous emulation will be the incentive to work. Compulsion may be replaced by a generous allowance of liberty.

Knowledge, instead of marks, will be the reward of earnest effort.

The method of instruction is of first importance. Mere recitation from text-books should be avoided. Instruction should be by lectures, demonstration by the instructor, discussions, quizzes and theses. The individuality of the student must be recognized. "Every educator now recognizes that individual characteristics are always sufficiently marked to demand his earliest attention, and there is a stage in the process of education, where the choice, the responsibility and the freedom of the individual should have a wide scope."—PROF. HARDY.

Progress in war, is the result of originality in study and research of the records of the past, made apparent by action in subsequent events.

Students who are especially efficient and zealous should have their names sent to the War Department, but class standing, except to show the "proficient" and "deficient" should not be published.

Great care should be exercised in selecting instructors. "The method of instruction is the instructor."—GUNDRE. Exhaustive knowledge, patience, zeal, firmness and experience are the essential qualifications; they are rarely found in a single individual, but when found in an officer, the schools should have the benefit of them as long as the possessor is willing to give them.

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birth to great surprises, because it creates in an hour the most unexpected means of action, the most varied artifices, applying them to circumstances with admirable precision. It is Moral Power resulting from three forces: the Intelligence which conceives; the Will which executes; the Courage which faces death."—COLONEL MAILLARD.

There cannot be a very wide difference of opinion as to the courses of instruction at the various schools, as the range of knowledge for proficiency in a particular arm is fairly well established. At the engineer and the artillery schools all pupils have had the same training, and the new instruction should begin where the old ceased. At the infantry and cavalry schools the course has to be adapted to different conditions of previous training, which makes its problem a little more complex than the others. The honor system should be dropped. It is wrong to encourage a few at the expense of the many. It may be an excellent incentive for youths ; it is unnecessary and harmful when applied to officers, because it seldom considers moral qualities and strength of character, which are vastly more important than the capacity to acquire information.

A letter should be placed in the Army Register after each graduate's name to indicate the school he has successfully passed through ; as, (I) for the infantry and cavalry school, (A) for the artillery school, (C) for the cavalry and light artillery school, and (E) for the engineer school.

#### THE ARTILLERY SCHOOL.

By the progress of events in which the artillery has played no little part, it has become the most scientific arm of the service. If we were to judge the progress of science and invention in the last thirty years by the changes in the material of war alone, we might well wonder at the power of intellect.

So far as the artillery is concerned, we may truthfully say, "former things have passed away." The muzzle-loading smooth-bore gun has been replaced by the breech-loading rifle, which makes shrapnel deadly at 3500 yards. The Rodman gun on its slow-working carriage is a plaything compared to the powerful engines of to-day, mounted on disappearing carriages and capable of throwing 10,000 pounds of steel in twenty minutes. The pot-metal keg on a clumsy iron base has given way to a 12-inch breech-loading rifled-steel mortar on a self-acting carriage ; guess-work has been superseded by complicated range-finders and relocators and electrical apparatus for tracking moving objects ; the old black powder which, unchallenged, played such a leading rôle in the history of the world for five hundred years, will in the future appear only in the books beside the names of its victims ; scores of smokeless powders and high explosives are now in ex-

istence; rapid-fire guns of six-inch calibre and machine guns firing 1200 shots per minute contribute to the perplexity of war.

A system of instruction which will make an officer expert in the use of all of these destructive agents must be extensive and laborious. We make no classification. Our artillery officers must be prepared to command light batteries in the field or sea-coast fortifications, as circumstances may elect.

It is impossible to cover the ground thoroughly in two years. The light-artillery sub-school at Fort Riley was very necessary to relieve the congestion of the Fort Monroe school, which should be a practical school for heavy artillery. The instruction at the school is directed by the staff, which consists of the commandant, the two other field officers of artillery on duty at the post, and the commanding officer of the Fort Monroe arsenal.

At the Royal Artillery College, Woolwich, six of the fifteen instructors are noted civilian experts in chemistry, mathematics, electricity, guns and armor, etc. We should have similar men in charge of the departments of electricity, chemistry and mechanical engineering. I do not intend to reflect in the slightest way on the zeal or the ability of the officers who have had charge of those departments in the past; the positions are temporary and officers newly assigned to them do not always bring much practical experience; no man can do justice to two or three professions at the same time. The prestige and influence of a school, and consequently its value to the student, are greatly increased by the addition of celebrated men to its corps of instructors. They inspire the student; they have his confidence and respect; they give a value to knowledge by the added weight of their authority, which enhances its importance in the eyes of the student and increases his desire to acquire it.

We shall not get the best results from these schools until the methods of instruction and the abilities of the instructors shall have reached a standard and acquired an influence which will cause young officers to eagerly await and gladly welcome their selection for the detail.

Tedious and dogmatic instruction in theory must be avoided. To cultivate moral and mental qualities; to increase judgment; to direct individual effort; to form a base for future self-instruction and awaken a love for work (the indispensable attachment of a solid education), are the rational objects of all military instruction. They should constantly be kept in view.

The lecture system should be employed in every department not purely mathematical. It requires a higher order of ability in instructors than recitations from text-books, but the results obtained with students of mature age, actuated by a desire to learn, are better and more lasting.

Theory should be confirmed and fastened in the mind by practical work. In topography, military and mechanical engineering, chemistry, electricity, submarine mining, signalling and photography, the instruction should be almost wholly practical. To facilitate practical instruction in fortification and heavy artillery, the school should be located in or near a modern sea-coast fortification containing types of the most recent guns, howitzers, mortars, carriages, search-lights, range-finders, and other heavy artillery material. The school should be liberally supplied with books, maps, models, apparatus and machinery, that students may have every facility for practical work and original investigation.

All ordnance officers should be graduates of the artillery school. If they have not been through it when transferred, they should be sent at the beginning of the next school year for special instruction in chemistry, metallurgy, explosives, mechanical engineering and electricity and ballistics. They should have special opportunities for visiting such works as the Naval Gun Foundry, the Bethlehem and Carnegie Steel Works, the Winchester Repeating Arms Company, the Providence Tool Company, etc. They should be required to turn in written reports on the management, economy and administration of these establishments.

It is not worth while to go into a detailed discussion of the course of instruction; it is clearly specified in the annual catalogue, and comprises the following subjects: military engineering, steam and mechanical engineering, exterior and interior ballistics, employment of artillery, artillery material, munitions, armor, etc., electricity, submarine mining and torpedoes, military science, chemistry and high explosives, cordage, telegraphy and photography.

This is an extensive list of subjects to be completed in two years, but when we remember that the students have already had good instruction in some of them, and that they have been selected from the upper halves of their classes at the Academy, it is not beyond their capacities.



This makes instruction comparatively easy. We rarely find classes with all the members so nearly equal in ability and attainments. With good methods the progress should be rapid and uniform. Practice should dominate theory ; principles should be fastened in the mind by practical illustration.

"It is better to show once than to explain twenty times."—DRAGOMIROW.

"There is a considerable interval between the knowledge of principles and the faculty of using them in making resolves. The method of instruction ought to tend to suppress this distance. It is by this method that the officer succeeds in acquiring the energy and force of will so important in war service."—GENERAL DE PEUCKER, late Inspector-General of Military Instruction in Germany.

Military history and hygiene are noticeable omissions from the course. It might be argued in favor of these omissions that strategy, tactics and military hygiene are not especially necessary to heavy artillerymen who fight only in fortifications, and are not exposed to the hardships of infantry and cavalry service. We must bear in mind that we have no heavy artillery corps yet, and our military policy demands the general preparation of all officers for any service it may be convenient to assign to them. Whatever reasons may be given for omitting military history from the West Point course, there can certainly be no good ones for omitting it from the post-graduate courses.

We want to cultivate military judgment ; why not go to the fountain-head? It is much better for the student to draw his own conclusions from the facts, than to be constantly accepting them second hand. We want to encourage individuality, independent thought, love of action, reason, and quickness of perception. I know of no single subject so well adapted to arouse enthusiasm in instructor and pupil. Its lessons are inexhaustible and ever new.

The courses of instruction are prescribed by the staff. They should not be so rigid as to deprive instructors of personal initiative and reasonable originality of method. The efforts of the staff should be directed towards securing unity of purpose, equalization of opportunities, and a just division of time and means.

Discipline must be rigidly enforced ; it must ever remain the most important subject. Student officers should be attached to batteries for instruction in drill and discipline.

However much we may differ as to methods, objects, and courses of instruction, we will agree that if the present course is pursued with the zeal and determination characteristic of the worthy officer, his knowledge and efficiency, and consequently his value to his country, will be greatly increased.

Until the artillery arm is increased it will be necessary to send officers to the school a second time to make up the complement of students.

Under no circumstances should an officer be required or permitted to pursue a second time a course of study in which he has once been declared proficient. A second detail should be a privilege to pursue a higher course of study and investigation in some special feature of artillery service or material.

Candidates for a second detail should apply through their post and regimental commanders, stating definitely their reasons for applying and what they hope to accomplish if the privilege is granted. The War Department should make the details upon the records of the applicants and the importance of the work they hope to do. Their work should be done under the direction of the staff of the school and they should be required to conform to the regulations for discipline and duty prescribed for other students.

The reputation of our countrymen for fertility of resource and originality in invention is world-wide. We can well afford to devote some of that talent to original work in military science.

#### THE INFANTRY AND CAVALRY SCHOOL.

It was founded in 1881, and assumed the artillery school regulations and methods for its early guidance. In common with all schools it was crude and unsatisfactory at first, but through the devotion and ability of its superintendents and instructors it has reached a high state of efficiency. It is greatly to be lamented that it cannot be expanded to give to all lieutenants of infantry and cavalry the advantages it offers to a few.

Since its organization about two hundred and thirty officers have been graduated, an average of but sixteen per year.

The remarks made on previous pages on methods and aims of instruction apply with equal force to this school. Its chief value will come from its practical instruction, and its effect on the discipline and *esprit du corps* of students. It has a definite

place in our system as a practical school for infantry and cavalry lieutenants. It is not wholly a post-graduate school, as many of the student officers have been promoted from the ranks or appointed from civil life. It is therefore necessary to take them through much theoretical work from which graduates of the Academy should be exempt.

In par. 33, of the programme of instruction, we find the following astonishing information :

“ The staff in its final decision as to the proficiency and relative standing of each student shall take into consideration the mark received for practical exercises, which shall have a value in each department as follows, viz. :

Military art (including essay),	100
Engineering,	150
Infantry,	33
Cavalry,	33
Artillery,	33

In par. 44, we find the following, viz. :

“ The maximum values to be assigned to the different departments, in ascertaining the figure of merit, shall be as follows :

Dept. of Military Art (including practical exercises),	300
Dept. of Engineering (including practical exercises),	300
Dept. of Law,	150
Dept. of Infantry (including practical exercises),	100
Dept. of Cavalry (including practical exercises),	100
Dept. of Artillery (including practical exercises),	75
Dept of Military Hygiene,	50

A glance at these values leads to serious reflection. Are the departments of infantry and cavalry in their special school only one-third as important as engineering and military art and less important than law? Have we not a right to assume that the fundamental object of this school is to teach student officers, first, all the duties and functions of their own particular arms, and then such accessories as time and circumstances may permit? Fortification, topography, signalling and photography are adjuncts to a military education, but we cannot for a moment admit that they are even equal in importance to the training and instruction of the young officer in the minor tactics, administration, and discipline of his own arm.

The sequel to this low rating is found in the undeveloped condition of these important departments.

The Department of Infantry includes :

Part 1. Infantry Drill Regulations. (Theoretical and practical.)

Part 2. Infantry fire and its uses in battle.

The Department of Cavalry includes :

Part 1. Cavalry Drill Regulations. (Theoretical and practical.)

Part 2. Equitation.

Part 3. Hippology.

In the detailed programme of studies for the Department of Military Art, we find the following subjects : military policy and institutions (4 sub-divisions) ; strategy (24 sub-divisions) ; tactics (17 sub-divisions) ; logistics (5 sub-divisions) ; military geography (5 sub-divisions) ; staff duties and administration (8 sub-divisions) ; exercises in application, with and without troops ; without troops consisting of, 1. Field service exercises ; 2. Manœuvres on the map. If this course is thoroughly taught there will not be much time for individual training in infantry and cavalry, and the name of the school should be changed to War College, and it should be opened to officers of all arms.

It is the old West Point idea that in case of war we are all to be generals ; consequently, strategy, grand tactics and logistics usurp the time and labor which rationally belong to the company and the battalion. We do not seem to be able to overcome a desire to begin at the top instead of at the bottom.

The sentiment of the service for the Leavenworth School will be more kind, details to it will be more eagerly sought, and the antagonistic feeling so common to students which makes good instruction impossible, may be overcome when it is put in rational accord with the object of its existence ; when the departments of infantry and cavalry are put at the head of the list instead of at the bottom, and the other subjects are grouped about them as accessories in the order of their importance.

The tendency of an elaborate system of theoretical instruction is to make war appear complicated and abstruse ; and to divert the attention of the student from his present rank and duties, to an idle contemplation of the remote possibilities of the future.

All of our schools have suffered severely through the lack of good instructors.\* An order to instruct has been deemed all

\* To fulfill the functions of an instructor, it is not sufficient to know theory, nor



that was necessary to make an instructor; consequently the school has had to instruct both student and instructor. The text-book which could be closely watched became of necessity the boon companion of the instructor, and the system became dogmatic, uninteresting and irksome to the last degree. In some cases the instructor brought less experience and but little more knowledge into the section room than some of his pupils; he could not possibly exert any beneficial influence over them, and necessarily retarded the progress of the school. That our schools survived the scourge was due to the fact that having been created by order, the *coup de grace* could be given only in the same way.

It is no disgrace to say of an officer that he is not a good pedagogue. Teaching as an art can be acquired only by long years of experience. If a man has no fondness for it and lacks the personal characteristics which win the students' esteem and confidence, he will never succeed. It is remarkable how very few really good instructors are found among men who adopt teaching as a profession.

When we find a first-class instructor, we should keep him. His services are of vastly greater importance in assisting in the training of young officers than in doing routine garrison duty.

During the first year the infantry officer should be instructed theoretically and practically in the principles of combat, advanced and rear-guards, outposts, patrols, drill regulations, marches, escorts, reconnaissance, administration, fire tactics and fire discipline,—for infantry alone. Beginning with the squad he should progress to the battalion. Company and battalion commanders control the fighting line, and consequently the fate of the day. Generals will have but little control or influence over the fight after the men are once in; the secret of modern military training is to make the battalion perfect. A similar course should be established for cavalry officers, with the addition of equitation and hippology. As the cavalryman has more to learn than the infantryman, the Government has a right to demand more labor from him. These departments should be

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even to recite it with faultless rhythm. Teaching is one of the most difficult arts; it is acquired above all by practice."—*Journal des Sciences Militaires*, 1888.

"To be instructor means, being given a principle, to know how to deduce by reason its practical applications; it is still further to know how to teach this reasoning to others so that they shall be able to apply it again under all circumstances."—*Ibid.*

called the departments of infantry and cavalry; they should be the most favored and count most in the order of merit. In estimating the capacity and ability of a student for practical work, discipline, zeal, simplicity and individuality and a desire to succeed should count three points, as against one for knowledge of the book.

During the winter months, regular out-of-door work will be impracticable. Systematic theoretical work will then be in order. For this work the class should be divided into two sections; one section to contain graduates of the Military Academy who have once been declared proficient in law, ordnance and gunnery, drawing, civil and military engineering; the other to contain officers who have had no theoretical instruction in those subjects. It is not possible to put both sections through the same course and do justice to both; either one will be unjustly retarded, or the other unduly advanced. To relieve the school from this difficulty, officers appointed from the ranks or from civil life should report one year sooner than the other members of the class to be taught the subjects mentioned above. All could then begin the regular course on the same footing.

During the second year the practical work should be a continuation of the work of the first year, practical field engineering, combinations of the arms in minor tactics, infantry and cavalry, infantry and light artillery, cavalry and light artillery. A squadron of cavalry and two batteries of light artillery should be stationed at the school.

Two years careful observation of the practical work of the students will give a just basis for judgment as to their qualifications for duty in the arms to which they have been assigned. A cavalry officer poor in horsemanship, slow in action, or lacking the physical and mental qualities that give energy and enthusiasm, should be recommended by the staff for transfer to the infantry. An infantry officer of not over three years' service, who desires to be transferred to the cavalry, should upon entering the school file his application with the Secretary of the school; at the end of the course, the staff should endorse upon the application, its opinion as to the advisability of the transfer for the best interests of the service. Some of the flagrant errors made in the first assignments can thus be corrected. Personal preferences are of little weight compared with the efficiency and reputation of the army.

Theoretical instruction should be given, first in those things which can be fastened in the mind by practical application. The extra time can then be wisely devoted to military history, the art of war, tactical problems on the map, war games, staff duties, and essays on military topics assigned by the instructor.

The Government is entitled to eight hours per day of honest labor from its employes; it can justly demand more than that from young men who will probably have many years of comparative ease.

It seems incredible that an officer should be so lacking in pride as to permit himself to be declared "deficient" in a service school. There should be a section in the Revised Statutes to read as follows:

Any officer of the Army of the United States, who, through wilful neglect, lack of application, or from want of ability, shall be declared deficient by the staff of any military school of the United States, shall be dismissed from the service.

The Leavenworth School is an important link in our chain of instruction. Its influence reaches deeply into two great arms of the service; in a few years its graduates will attain rank and command; how essential it is that its instructors shall grasp the spirit and methods of the new instruction, which places discipline, loyalty, zeal, determination to conquer and self-confidence first; daily training in all of the details and duties of one's own arm, second; and last, such accessories as may be considered necessary as preparation for high command, or for adding to the accomplishments and general usefulness of the officer.

Zealous devotion to the duties and opportunities of the present is the best preparation for the future.

#### THE CAVALRY AND LIGHT ARTILLERY SCHOOL.

It was a happy thought that inspired the founding of a joint training school for these sister arms of the service. It is also fortunate that its rational place in our system has steadily been kept in view, and that it has not been enticed into the mazes of text-book instruction, but has remained what it should be—a practical school.

The spirit of these arms is, action, initiative, celerity. The same spirit must be the dominant feature in the teaching. The recommendations of its commandants are the best guides for its treatment by the War Department.

It should have three squadrons of cavalry of four troops each, taken from different regiments; a battalion of light artillery and two horse batteries. Each troop and battery should remain three years. They should have constantly their full complement of officers, and an officer detailed to the school for instruction should not be taken away, except in pressing emergencies, before he has completed the course. All additional second-lieutenants in these arms should be sent to the school.

As this is a school for the training of non-commissioned officers and men, the troops should be kept on a war footing and should not be sent on detached service until other possible details have been exhausted.

The scheme of instruction is clearly set forth in the annual report of the commandant, and need not be repeated here. Three days per week during the drill season should be devoted to practical exercises in minor tactics; the two intervening days should be given to close order movements which perfect the discipline and solidarity of officers and men. The last two months of the season should be devoted to combined operations of the two arms and of the three arms, the scheme will be described later.

The theoretical work should be confined to lectures on the history and development of cavalry and artillery and their tactical uses. The principles laid down should be practically illustrated on the ground at the first opportunity. The Lyceum should be a tactical school for officers, the main features of which should be the study of tactical problems on the map or on models of clay or sand; discussions of campaigns in which cavalry and artillery played leading rôles, and essays.

Marks and order of merit have no just place in this system. The number of students is so small that their proficiency can readily be determined by observation of the interest and zeal they put into their work. The names of those who show unusual aptitude coupled with the enthusiasm and energy so necessary to a brilliant career in either of these arms should be sent to the War Department.

The lazy and indifferent should also be reported for reprimand, and they should be warned that at their next examination for promotion they will be required to show satisfactory knowledge of all subjects taught at the school.

Here as elsewhere the method and the spirit of the instruction



are most important; determination, rapidity in thought and action, dauntless courage and an *élan* that never flags, are the qualities found in such men as Sheridan and Stuart. All young officers possess these qualities to some extent; they must be stimulated by personal instruction and by example.

The young officer will also need instruction in discipline—the true discipline of the officer—"a quality of heart and will." Example is the best teacher; friendly but firm control by his company commander, the counsel of his superiors and the study of the lives of great soldiers, are valuable aids to instruction.

#### THE STAFF.

I cannot devise any logical or feasible system of instruction for the staff under the present organization. A radical change is hardly a remote probability. When we reflect upon the influence which staff officers have had on battles and campaigns, we are strongly impressed with the importance of filling these positions with men of the highest professional ability. A young galloper suggested Bredow's charge. Lee's "lost order" gave the Federals much valuable information. An aide was sent with Napoleon's order to Vandamme in June 1815. His horse fell in a ditch and the order was never delivered. Whether it was his fault in going alone, or that of his chief-of-staff, in permitting him to do so, is immaterial.

We should have a flexible instead of a rigid staff. We should be instructing a number of officers in general staff duty. At stated periods they should be returned to the line and be replaced by others. A War College would be an essential part of such a system. Under the present system we must rely on the service schools. They can give some instruction to men above the average of the ability of their classes.

If examinations for promotion were extended to include the grade of colonel, staff officers might be required to show an extensive knowledge of military science and to retain an active interest in the affairs of the line.

#### SERVICE TRAINING.

The school instruction outlined in the preceding pages occupying but six years and usually completed before the age of thirty, is but a prelude to the work which must be done during all the remaining years of active service. The importance of the school in the formation of character, mind and body, is very great.

The knowledge acquired from books is evanescent ; but mental and physical characteristics are tenacious. Youth is impulsive and radical ; age is thoughtful and conservative. Impulsiveness softened by judgment, and rashness tempered with discretion are admirable soldierly qualities.

The charge is laid against us that we are rapidly becoming a theoretical army, and it is not without some just foundation. It is a grave charge and the reasons for its existence should be answered.

Daily practical work in every camp and garrison is now believed to be the only safe preparation for war.\* It is the principal method employed in the great continental armies which are being prepared to struggle for the existence of great nations. That great and invaluable training-school,—the frontier,—has practically disappeared. We have no quarrelsome neighbors or restless colonies upon whom we can periodically practice our art. It is hoped that in a few years the National Guards of all the States will be fully competent to enforce their laws without assistance from the Regular Army ; consequently we are, or soon will be, thrown upon our own resources for that practical knowledge and experience so necessary to successful command in war. With these facts in mind, I repeat with emphasis that the service training of the officer should be practical work in all of the details of his profession, from the "school of the soldier" to armies against armies.

It is well known that the officers who attained the highest command in the War of the Rebellion were taught in the greatest of all schools—experience in war. They took part in the Mexican War or in war against the Indians on the frontier or both. It will suffice if I mention Grant, Sherman, McClellan, Meade, Thomas, Lee, the two Johnstons and Longstreet.

Sir Charles Napier said he was prepared to teach a great deal of tactics to a regiment in any part of Great Britain, because he could, with a small body of even ten men marching along a road, teach the preliminary and fundamental principles of military art.

We have been inoculated with the idea that in the event of war regular officers would at once attain high rank and command ;

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\* "The feature of future wars will be their suddenness, the promptness of operations, the briefness of time in which decisive events will come about ; we must be ready *before the first hour.*"—GONDREÉ.

therefore they must devote much time to the study of strategy and grand tactics, confining practical instruction to the company and battalion drills prescribed in the drill regulations, making them sufficiently frequent to insure a fair amount of discipline and a good appearance before the inspector.

The proper objects of parade-ground drill are instruction in discipline and preparation of the units for tactical work in the field. We have regarded garrison drill as the climax of training: it is the beginning; the means, not the end.

In close-order drill we master the alphabet of war; in minor tactics we reach words; in manœuvres we combine the words into sentences which express thought, lacking the fire and passion of that inspired by actual war.

The great pianist practices the five-finger exercises for hours daily, to give his hands strength, agility and accuracy. They are wearisome but necessary preludes to great symphonies, which charm and delight thousands. The peace training of an army should prepare it for war, otherwise its *raison d'être* is not well established.

An army in war is generally found in one of three situations: in combat, on the march, or in camp at rest; the practical training of officers and men should therefore be constantly directed to perfecting them in every detail connected with those situations. It is of course impossible to imitate even faintly the casualties, hardships and accidents of actual war. We can practice faithfully the tactics of field and camp which we expect to use when war comes, and can strive to develop the qualities of mind and heart that nullify suffering and distress.

War would be quite simple if the earth were a vast open plain, with free vision and easy communication in every direction; theory would have its maximum value; for, war would be conducted on geometrical lines as laid down in some text-books. The complications of modern warfare are largely due to the diversified and ever changing forms of nature, and the works of man, which become either conveniences or obstacles, according to their value to friend or foe.

The artist views the land for its picturesqueness; the geologist, for its strata, minerals and fossils; the soldier is concerned with its tactical importance; how he would attack or defend localities; how he would post his out-posts; where he would camp or bivouac; in fact, he could devise an endless variety of problems.

In war, his success would depend on the correctness of the solution and the energy by which it was effected.

Some distinguished soldier, whose name I cannot now recall, said "I attribute the greater part of my success in war to the habit I acquired when young of continually studying the ground as I marched with my men. I would fancy my command attacked at various places and would, in my mind, dispose of the troops to meet the emergency. Thus I was constantly practicing with the tools and material I was to use later."

Battles are rare occurrences; marches and camps with their attendant advanced and rear guards, outposts, patrols and reconnaissances occur daily.

In our next war we shall probably meet an enemy, thoroughly trained in all of its details. To meet him on equal terms, we must begin preparation at once.

The instruction must begin as soon as the lieutenant joins his company.

The captain should be held responsible for this, as laid down in par. 185, I. D. R. and he should be permitted to conduct it as specified in that paragraph; and then be held responsible for methods and results.\*

We are many years behind in our methods. We talk glibly and knowingly about "the increased individuality and responsibility of company commanders under the new battle conditions," but we have taken care to suppress all cultivation of those qualities in time of peace. Individuality with good judgment, and a willingness to assume responsibility when thrown on his own resources are admirable qualities to cultivate.†

The young officer should at once be started on the road to a knowledge of company administration. The captain should teach him to inspect the barracks, the mess, the clothing and equipments of the men. He should serve an apprenticeship in the company office until he can correctly and readily make up all the records, returns, rolls, requisitions and correspondence. At a suitable time he should be given charge of the messing that he

\* "The instruction of the lieutenant of the company is considered one of the first duties of the captain. It is further developed under the battalion commander; so that each, from the general to the corporal, is in turn instructor and pupil."—KAULBARS on the German Army.

† Without fearing responsibility, every officer in all circumstances however extraordinary, is to stake his whole personality for the fulfilment of his mission, even without waiting for orders.—Felddienstordnung, 1887.



may learn methods of cooking and caring for rations. If he is of the right material, and has proper interest in his work, he will soon become proficient in these details. He must be instructed in the proper methods of disciplining men; how to combine firmness with justice, to exercise authority so it shall exist for the benefit of the governed and not as a perquisite of the governor. His own discipline must not be neglected. I am not an advocate of the harsh, rigid system of Germany. It is not attainable in our military system, nor is it suited to the character of our people; but our system is too lax; it needs strengthening.

Instruction in guard duty and the practice of military courts will naturally come in the course of his duties.

Almost every officer gets some experience in post staff duty. We do not expect to make expert staff and line officers of all, but a knowledge of the duties of an adjutant, quartermaster, commissary, may prove valuable to an officer, who must (in our service) often be a general utility man. But few second lieutenants join a regiment each year. It will therefore be an easy matter to attach them in turn to the offices mentioned above, during the winter season, to learn the systems of work, supply and accounts. Many men despise details and affect a superior knowledge of what they call the great principles of their profession. Frederick and Napoleon found nothing so small as to be beneath their notice.

We have arrived at the point from which the training of the officer and the enlisted man must proceed together. The captain\* and the lieutenants will be the instructors, and at the same time pupils aiming at greater self-perfection.

The second lieutenant should be given charge of the squad drill, and be kept at it until the captain is satisfied with his method and knowledge. In superintending and directing the training of the individual soldier, his intelligence, earnestness, and ability to instruct will soon be made manifest. He will not be fit to command a company until he has mastered the processes of training and developing its individual members. The efficiency of the group is but the average of the capabilities of the individuals who compose it. He cannot too early learn to be patient,

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\* "The instruction of the lieutenants of his company is considered one of the first duties of the captain. He alone can guide them to the proper road, make them understand and love their duties, prepare them, in a word, to become later in their turn, good company commanders."—Official German.

zealous, and just, and thus gain the respect and confidence of his men, which is the foundation of all good instruction. When the captain is satisfied with his progress, he may advance him to command of the company during a portion of the drill hour.

After all drills, the captain should kindly and quietly correct any faults and errors he may have discovered. In the tactical work he should encourage intelligence and spirit rather than a pedantic adherence to set forms.

Progress and variation are necessary to sustain interest in any occupation.

An examination of the Army Register shows that the senior captains of the line have been doing company duty for thirty-four years, including four years of war service. They are more than human or have retained more than their share of youthfulness, if they can still put any enthusiasm into parade ground drills for the company and the little duties which should long ago have been relegated to their juniors in age and rank.

It is well-nigh impossible to prescribe a system of instruction for officers which can successfully contend against these disheartening conditions. The political economy that keeps expensively educated and trained men in subordinate positions during the best part of their lives, is very weak and near-sighted.

We cannot vivify the dead past. Our duty lies in the present; in a new system of instruction which shall be based upon quality rather than upon quantity; which shall have unlimited variation; which shall make progress possible and sustain interest; which shall cultivate the *morale*, said by Napoleon "to be three-fourths in war."

Let us take a day's work for a company under a modern system, so far as it relates to the instruction of the officers. The captain has familiarized himself with the ground in the vicinity of the post. He is going to give the company instruction in outpost duty. It is assembled in light, or heavy, marching order shortly after breakfast. It is conducted without delay to a chosen locality. The junior lieutenant may be kept with the main body for instruction in methods of marching troops, or he may be directed to make the itinerary of the route, or he may be ordered to report to the senior lieutenant for instruction in advanced guard duty as the captain may elect in pursuing his system.

Having arrived at the place chosen for the exercise, the cap-

tain announces that the company is to furnish a support and two pickets in a system of out-posts for the main body encamped at a point in rear. The first platoon is to form the support and the sections of the second platoon are to be the pickets. The captain locates the support, assigns a picket to each of the lieutenants, directs them to post them and to throw out two double sentinel posts from each. As soon as the work is completed, the captain accompanied by the lieutenants, inspects the positions, requests each officer to give his reasons for selecting the posts of his picket and sentinels, what preparations he would make for defense, what instructions have been given to the sentinels, what patrols he would send out; and directs each to prepare a report and sketch for the commander of the out-posts. He makes such criticisms as he deems necessary, out of hearing of the men. He examines the sentinels, asks their orders, the ranges of certain points, how they are going to see as much as possible without being seen, questions them on orientation and the numerous detailed duties of their positions. On another day the lesson may be varied by detailing a few men to represent an attacking party of the enemy, or new ground may be selected. The lessons may be repeated as many times as there are variations of terrain within reach. Each lesson will occupy a morning. Other lessons may include the use of the company as the advanced guard of a battalion with all of the details of points, flankers, patrols, attack and defense, crossing of streams, reconnaissance of woods and villages, or, as a rear-guard delaying the enemy until the main body has reached a place of safety.

The construction of rifle pits, the occupation and intrenchment of defensive localities and the construction of obstacles can be practically carried on at many posts surrounded by large reservations.

The cavalry must be ready when war is declared; its peace training must therefore be constant and extensive. As it is the "eyes and ears," patrol and reconnaissance work, screening the army, keeping touch with the enemy, guarding convoys, transmitting orders, destroying railroads and bridges, and swimming streams, are legitimate parts of its peace instruction. We cannot, of course, destroy railroads and bridges in time of peace, but we can examine them and decide upon a plan of action should similar conditions be imposed in actual war.

There is no difficulty in deciding what to do; the trouble lies

in determining how it shall be done, and doing it. Mentally we are lazy. It is much easier to hold to routine, "that microbe of human thought," \* than to shake off mental lethargy and originate and act upon new ideas,

Routine destroys originality; it begets apathy and is outraged by innovation. It is inimical to the qualities we are most anxious to preserve. A great deal of routine work must be done in every profession and ours is no exception, but we have a wide range of subjects with which we can for seven or eight months of the year vary the dull routine and monotony of garrison life, stimulate mental activity and give healthful employment for the faculties which will save them from atrophy.

In addition to the opportunities mentioned above, we have extended order drills which should always be held on varied ground. New conditions can be had by marching to new localities.

Companies may be combined for joint operations, one to act offensively; the other, defensively. No two consecutive drills need be alike; a constant variation can be maintained.

Three mornings per week should be given to minor field exercises and two to close order movements. The last two months of the drill season should be devoted to the battalion in a course similar to that outlined for the company. The major will not only perfect the training of his own unit, but will also judge the efficiency of the instruction given by his company commanders, knowing that he in turn must answer to the colonel. Each grade should be entrusted with the responsibilities which belong to it, and be held responsible for the way in which they are discharged. Increased rank would then signify greater experience and greater ability.

Par. 252, Infantry Drill Regulations reads:

"The major is responsible for the instruction of his battalion. The officers are assembled for theoretical and practical instruction."

For fear this might be misunderstood, it continues:

"The instruction of officers embraces the Drill Regulations and such other instruction as pertains to their duties in peace and war."

The intention is clear and unmistakable. Has the enacting clause been struck out, or are we to adopt some day a rational common sense system of instruction and responsibility?

\* General Iung.



If an officer is not morally, mentally and physically fitted to energetically perform all of the duties of his grade, he should be replaced by one who is.\* Twenty-three hundred officers selected from seventy millions of people should as a corps be without peers.

"The regiment manœuvres but does not fight," is a German maxim. Regimental drills are principally for the benefit of the field officers.

Each regiment should be a school for its officers and men. A generous emulation could be aroused by bringing two or more regiments together for tactical movements at the close of the drill season. The rivalry would stimulate regimental pride and encourage industry.

Enough troops to represent two small brigades should be assembled each autumn at some point on the frontier (preferably Fort Riley, because the cavalry and light artillery are already there) for field manœuvres. Each company should have its full quota of officers and be placed on a war footing. Any other officers whose services could be spared and who would be willing to take leaves of absence for this purpose, should if they desire be attached to the commands. They should be required to make reports and criticisms in writing at the close of the manœuvres.

Each evening, the movements of the day should be discussed at a meeting presided over by the commanding officer. The remarks of the juniors should be called for first, to encourage independence in thought and careful judgment before expression of opinions.

We must remember that military science is not an exact science and that the same results may be obtained by different methods. The most capable officers in the service should be detailed to act as umpires at these manœuvres. Their decisions and reports should be printed and be circulated throughout the army.

Regiments should not be permitted to participate in these

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\* It is the special duty of the general commanding to see that all of the commanders of divisions, brigades, regiments and battalions and all the field officers in the district of his army corps retain their posts only so long as they have the bodily activity necessary for service in the field, and the knowledge and capacity needed for their several particular callings. The moment he notices in this respect the slightest change to the detriment of my service, it is his duty, for which he will be held responsible, to inform me."—King's order in Cabinet, March 13, 1816.

manœuvres until the tactical instruction of their companies and battalions has prepared them for higher instruction.

"It is to be well understood that the object of these manœuvres is not to illustrate war, but to develop the instruction of the troops as well as that of the officer."—Official French.

All instruction must be progressive. Starting with simple tactical exercises, we must reach the complex ones gradually, giving to each element the time and labor its importance deserves.

Theoretical instruction is analytical; practical instruction should be synthetical. We must begin at the bottom, and build up a simple, solid structure which shall survive the vicissitudes of a long and varied career. Such a structure must be founded on discipline and character and be cemented with loyalty and zeal.

Knowledge acquired from text-books does not tarry with us long unless it has been fastened by some practical illustration. The eye is the most potent feeder of the intellect; we rarely forget the main features of a landscape we have once carefully observed. The impressions made on the mind by careful and interested observation of tactical movements done on the ground, would be still more indelible. Theoretical instruction is apt to be dogmatic, and to attach great importance to set rules and normal formations. Normal formations are necessary. They are condensations of what we consider the best types and are safe guides for those who lack self-confidence, experience, and skill in handling troops. They must not be permitted to destroy initiative and individuality. They should be recommended rather than prescribed.

We are making a start in the right direction. We have not acquired much momentum yet, perhaps it is well to go slowly at first. Each department commander should order three drills per week in minor tactics and two in close order movements, for every infantry and cavalry post in his command during the available season. The methods and system of work may be left to the judgment of the post commanders, who must adapt them to the capabilities of their commands, regulate the progress and control the spirit of the instruction.

The object of the autumn inspection by the department commander, or his inspector general, should be to examine, on the field, the results of the season's work.\*

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\* "What the inspector inspects, that will the instructor practice his men in. The longer the period of peace, the more this usage will take root."—HOHENLOHE.

The average number of companies in a department is forty—ten battalions. Four days ought to be devoted to the inspection of each battalion. The inspector should give particular attention to the discipline, interest and zeal of the officers.

We have a right to assume that the principal object of an inspection is to determine the readiness of the command for actual service, which must include not only the service of the present, but future contingencies as well. Four days of minor field-exercises, held near the close of the drill season, would fairly demonstrate the efficiency of a battalion, to an expert inspector.

The inspections of the administration and interior management of the commands can properly be made during the winter months. If the inspector is an officer with high professional attainments, as he should be, his criticism and suggestions will be of great benefit in future work.

This system of responsibility, work and inspection appears complex at first glance. It should not be so in practice.

The tendency of peace service is to increase the number and magnify the importance of details. War obliterates all but the simple principles; we must therefore strive at first to make the instruction as simple as possible, and should keep it so until the officers and men are thoroughly drilled in the principles upon which the details are laid. Even Clausewitz, who wrote so extensively and learnedly on war, admitted that "war is simple, but the simple is often difficult of execution."

Let us take patrol duty for example. The principles are,—get all the information you can, and see as much as possible without being seen; do not get cut off from the main body; if surprised one must escape to carry back the information; always keep in mind the object of your mission.

If these principles are successfully carried out in war, it will make little difference how success has been attained.

The officer or non-commissioned officer in charge of the patrol, will not devote any time to an effort to recall what the book states; it will all be given to directing his men and watching for signs of the enemy. His sole guides will be judgment and experience: the first is closely related to the latter. The greatest teacher is war; as we must be ready "before the hour," the only safe course is to simulate war as nearly as possible, giving unremitting attention to the cultivation of the moral qualities,—cour-

age, discipline, loyalty, and that indescribable *élan*, now more potent than ever.

TACTICAL INSTRUCTION.

During the long winter months systematic out-door work will be impossible. We must turn our energies into some useful channel. What shall it be?

“Throughout the Prussian army they require of each officer, during the winter, a memoir written on a given subject. The subjects are designated by the battalion commanders, who in their choice must arrange them so their officers will be obliged to work and reflect. With this in view, they put the questions so they cannot be answered in a few words, but the officer must on the contrary be required to make long and careful research through the books at his disposition. Thus they are not content with requiring of an officer an account of some battle or campaign, but compel him to produce a criticism of it, or to discuss judiciously the influence of particular circumstances on the course of events.”

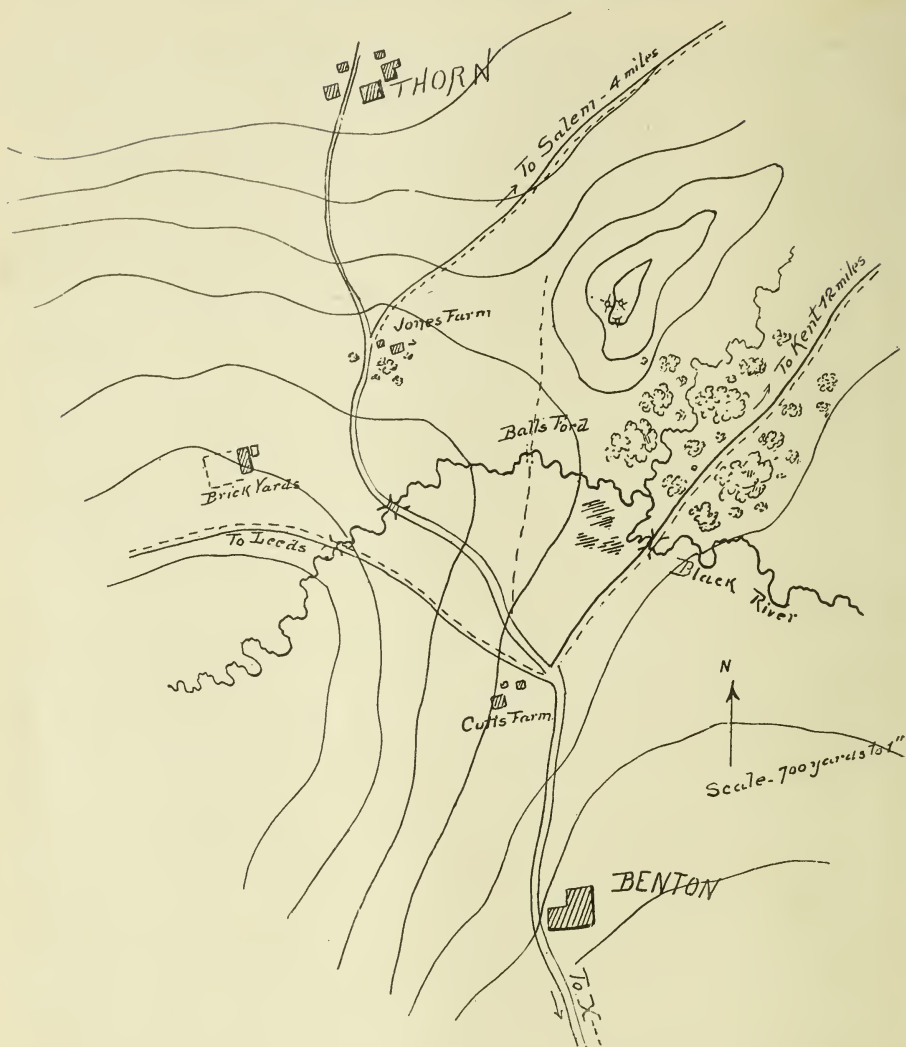
“The French by a ministerial decree put before their officers a long series of questions requiring hard work, numerous researches, and serious reflection. They were eminently fitted to form the judgment of the young men, but were insufficient to develop their tactical instruction.”—*Journal des Sciences Militaires*.

We find sufficient points of similarity between the German system and the Lyceum to lead us to believe that the latter is an undeveloped child of the former. None of these systems is fully adapted to our wants at present. We need a tactical school which shall develop our thinking qualities instead of filling our heads with a lot of unarranged, undigested information. The machinery of the Lyceum is now in operation. To get a new product we need only change the dies. The only apparatus required, will be a few black-boards and some wide cartridge paper. The commanding officer may prescribe the problem, or he may designate some officer to provide it. We must start with simple ones. Von Moltke prepared many for staff officers, and we have his solutions for reference.

The following example will clearly illustrate the system I propose:

A map (see map) of a bit of country is put on the board or on large paper, before the time set for the meeting. After the





meeting has been called to order, the presiding officer announces the problem for the evening as follows:

#### THEME.

The advanced guard of an army corps comprising, 1 regiment of cavalry (12 troops); 1 brigade of infantry (3 regiments); 1 battery of artillery (6 guns) and 3 ambulances, is marching along the main roads towards Thorn (map).

Arriving at Bern, where it should pass the night, the commander receives the following order:—

X—June 5, 1896, 11 A. M.

The enemy's scouts have been seen near Thorn. It is urgent that you advance to the line of the Black River at once. You will proceed with all possible despatch to Benton, where you will halt and dispose your command so as to hold the crossings of the river.

Official

S—.

B—

Major General, Comd'g.

Asst. Adjt. Genl.

The theme having been placed on the board near the map, the work for the evening would be as follows:—

1 To draw up the orders to be given by the commander of the advanced guard.

*a.* To the cavalry in reference to the service of exploration.

*b.* For the service of security for the night.

*c.* For the bivouac of the main body of the advanced guard, and its disposition for combat in case of attack.

2. The reports of the following officers :

*a.* Of the cavalry officer charged with the exploration.

*b.* Of the commander of the out-posts.

Thus five logical and simple sub-divisions of the work can be made and one can be assigned to each of five officers.

At the beginning of the course the topics may be assigned before the meeting, to give the officers opportunities for familiarizing themselves with this kind of work ; but after a few months' experience, the conditions as to time and information should be made to conform to those of war as nearly as possible.

After all of the work, such as the orders, reports and maps has been put on the boards, the problem should be open for discussion. Beginning with "a." the events should be taken up in the probable order of their occurrence. Each officer should have an opportunity to explain his work when it is reached, and a final reply to the criticisms passed upon it.

The commanding officer should preside and direct the order of work.

In problems similar to the one given above, each order should be taken in turn and examined to see if it is plain, if it contains proper and sufficient information. It may also be discussed from a tactical point of view, but we should be careful to impress

upon the minds of young officers that orders from superior authority are for execution and not for discussion.

Having finished the orders we pass to the reports which should explain in detail;—the movements of the cavalry in exploration; the location of the outposts in detail, accompanied by a sketch; and lastly, an investigation of the proposed method of defending the crossings of the river.

There is certainly ample material in this little problem for one, possibly two, evenings' work. The discussions would not end with the close of the meetings. They would furnish a great amount of material for daily thought. They would fasten tactical principles in our minds, develop independence and originality of thought and increase our power to think quickly and correctly. All officers would be interested in the school. Young officers would get the benefit of the knowledge and experience of their superiors, as they cannot get it now.

Essays are usually prosy compilations, quite as uninteresting to the reader as to the listener. They cannot be compared in educational value to the tactical school outlined above.

The problems are unlimited in number and variation. Original ones may be alternated with historical ones, preference being given to combats and battles in which our countrymen have taken part. Our patriotism will be increased by the study of the heroic deeds of our people, and we will become more familiar with the methods of fighting of the men we must lead in action.

By adopting this method of instruction we might be relieved from the insinuation that field officers and "captains over fifty years of age" cannot compete in essay writing with young subalterns. It might also demonstrate that the profession of the soldier is not unique, but is like other professions in this—age and experience are badges of wisdom, moderation and good judgment.

The "war game" on maps, or on clay, or sand models is excellent winter employment and good tactical training. It could be played in conjunction with the course given above.

Good umpires are necessary in this game. We could soon develop them. If small problems could be solved, first in the war game, and afterwards on the ground, the benefit would be greatest.

War games must not be taken too seriously. We must remember that the little markers are inanimate objects without

emotions. They do not get tired, or footsore, or hungry; they take no account of weather or roads; they never disobey or misunderstand orders; they advance or retreat at will; they suppose perfect discipline and courage; there is a tendency to move troops from one flank to the other, or from one locality to the other according to set rules. They take no account of gallopers or aides. On a map we see the whole country at a glance, and all the positions of our own men. We know exactly what our messengers and detached units are doing at any instant. This is not war.

A study of the game undoubtedly develops the thinking powers and fastens tactical principles in the mind. It is excellent for illustrating theoretical knowledge, as problems in mathematics illustrate the rules. We may learn to select proper locations for batteries, squadrons or battalions; we may simulate the marches of various units and speculate on the number of killed and wounded, but we cannot introduce any accurate estimate of the moral conditions which are more important than position or numbers. If these facts are kept in mind by the players, the games may be made very useful. Any occupation which encourages professional study and reflection will have a good influence on the service.

#### EXAMINATIONS.

An experienced educator is authority for the statement that "examinations are usually permissions to forget." We are not in a position to dispute the professor's remark. Previous notice of an examination is usually warning to begin the "cramming" process. An officer of average ability can in a few weeks accumulate sufficient knowledge to carry him through his examination for promotion. It does not mean much to an ambitious, studious man, but it is undoubtedly a necessary stimulant to the sluggish energy of the indolent and inefficient. The moral effect is only temporary, because where they are most necessary, they operate by appealing to the low sentiment of fear, and as soon as the fear is removed the subject resumes his normal condition.

To obtain any lasting effects they must be thorough and exhaustive, and the penalties for failure must be rigidly exacted. They should be oral and practical. It is very hard to "cram" for practical work. Written examinations are necessary with large classes. As we have to examine but three or four men at a time the oral method can and should be adopted. More ground



can be covered by this method in one hour than in a whole day by the other method.

As an illustration let us take the examination of a lieutenant for his captaincy. It should be arranged as follows:

Practical	{	Drill Regulations of his own arm.
		Minor Tactics, " " " "
		Road or Position sketching, foot or mounted.
		Signalling.
		Equitation (for cavalry).
Oral	{	Administration and economy of the company.
		Regulations (disciplinary and legal portions).
		Minor Tactics.
		Field Engineering, to include, hasty intrenchments, preparation, of localities for defense, and demolitions.
		Military and Constitutional Law.
		Articles of the Geneva Convention.
Written	{	The effect of fire, and fire discipline.
		A thesis upon some professional topic assigned by the Examining Board.

To the above mentioned subjects, which are applicable to all arms, we must add the specialties of each arm. A thorough test in a few vital subjects is preferable to a few written questions in each of many topics.

Examinations for promotion should be extended up to the grade of colonel, in every branch of the service.

I have reached the prescribed limits of space in an attempt to cover the subject in a general way. I have tried to emphasize the importance of methods and principles in the belief that if these are correct, the results of instruction will be good and lasting. This belief has been confirmed by every authority I have consulted.

I have endeavored to set forth a rational,\* judicious and feasible course of instruction for our officers; rational, because its object is to prepare them for their duties in peace and in war; judicious, because it is just, logical and progressive; and feasible because we have the ways and means within our grasp. No new

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\* "In all intelligent education the order of teaching is at once natural and rational. The subjects group themselves by their relation to the end in view, and the necessity of each new advance is evident to the student as soon as he is prepared for it."  
—"Brains of an Army." WILKINSON.

and improbable legislation is demanded ; we need but the active assistance of those in authority.

Our theories have grown ripe ; what we need most of all is the spirit of action. It is a common thing for men to claim priority of ideas in science and invention, but the man who makes them living, active agents in the world's progress, gets and deserves the rewards.

In military affairs it is frequently impossible for men who have progressive ideas to put them in force. Changes in method can be ordered only from the top, and those high in authority must remember that we are entirely dependent upon them for power to act. The War Department can at any time, if it chooses, put every suggestion I have made into practical operation (except a few bearing on the Military Academy, which was established, and is controlled, by law). The service schools were founded by orders from the War Department, and it retains control of them. Post and company commanders may be rich in ideas, but they dare not act upon them without specific consent from higher authority ; long service under this system destroys independence and originality, smothers individual initiative, and keeps us in the embrace of a narrow conservatism which atrophies the most useful mental and moral qualities of the officer. A wise and just system will nourish these qualities and direct them by discipline to a common end.

Our army occupies a peculiar position. It is essentially an educational army, a depository of military information. It does not even faintly represent the fighting power of our country, which will unfortunately remain latent until the enemy is at our gates. It is too small for effective offense or defense, or to form, as some falsely imagine, the nucleus of a respectable war force.

When the Indian question is settled, as it soon will be by the exterminating and irresistible processes of a higher civilization, and when the States become fully competent to preserve law and order within their boundaries as anticipated by the Constitution, what will be the prescribed work for the army, and how will it make its usefulness so evident as to insure a continuance of the good-will of the people, and a generous support ?

One hundred officers are on duty at our schools and colleges instructing young men in military science. Each year the number on duty with the National Guard is increased. The methods of work, the personality, the character and zeal of these officers

are under close observation and the keen scrutiny of influential and intelligent citizens. When they are strong and successful, the army is benefitted; when they are weak and unpopular, we receive an injury which is far-reaching, because censure spreads much faster and further than praise.

If to the number mentioned above we add the number on duty as instructors at the Military Academy and the service schools, we will find that about one-eighth of the line officers of the army are constantly engaged in teaching. As they are returned to their regiments at stated periods the number of experienced instructors is continually increasing. Officers who are competent to instruct brother officers, cadets, and college students, ought to be good instructors for their juniors in garrison. A proper system of instruction would make a school of each garrison with the commanding officer for director and all other officers as assistants, each to have the initiative and responsibility of his grade, and the whole to be bound together by an iron discipline and a common objective, namely, "to fit officers and men to perform justly, skillfully and zealously, all of their duties in peace and in war."

If, as the signs of the times indicate, we are to become an educational army, we must first perfect our own education. Our people rarely see the enlisted man, and are as a rule ignorant of his character, life and duties. They are becoming better acquainted with the officer, and will judge the army from his standard of character and efficiency: we must therefore be prepared to send to them officers "with all the military virtues."

It means hard, conscientious work; unity of purpose, and, above all, a *morale* which knows neither dishonor, disloyalty, nor defeat.

We have the ability and the desire, give us the opportunity.

## THE EFFECT OF THE MODERN SMALL-CALIBRE RIFLES AND THEIR BEARING ON THE MILITARY SURGERY OF FUTURE WARS.

BY MAJOR ALFRED C. GIRARD, SURGEON, UNITED STATES ARMY.

THE scientific study of the laws governing the action of small-arms and their effect on animal tissues is a comparatively recent one, and twenty-five years ago the crudest and most erroneous notions prevailed even among professional investigators.

The first impetus seems to have been given by the Franco-Prussian War of 1870, when the relative effects of the German "needle-gun" and the French "Chassepôt," with the increased range of the latter and the peculiar wounds produced (some even leading to accusation of violation of the Geneva Convention), set the German mind to work to investigate the causes which led to the variation in the wounds inflicted by their large-calibre gun of relatively low velocity compared to those of the smaller [calibre French gun with its greater range. The astonishing occurrences at Plevna, during the Russo-Turkish War, demonstrating the inferiority of the Russian weapon, are probably still fresh in the memory of the older members of the profession. The Turkish infantry, at a range of 3000 yards, inflicted serious losses upon the Russian forces, the guns of which were not effective at that range.

The example of the Germans was soon followed by all the European nations, and it was found that with the increase of range and lesser weight of the cartridge of the smaller calibre a greater velocity, consequently flatter trajectory, more rapid rotation and increased power of penetration, resulted. We have to deal, therefore, instead of with an initial velocity of 1315 feet, or 400 metres, of the Springfield rifle, with one of nearly 2100 feet, or 640 metres; a rotation of 2500-3000 per second instead of 710; at 1000 yards a velocity of 270 metres, or 885 instead of 235 feet. (I will not enter upon a comparison of the curves of the trajectory.) The extreme range of the Springfield was 3500 yards, at which the velocity was zero, while the small-calibre bullet, at a range of 7300 yards still has a velocity of 79 metres, or 95 yards, per second—sufficient to cause a severe injury.



A short description of the calibres of guns introduced by the principal nations may be interesting information.

Austria uses the Mannlicher, and Portugal the Kropatscheck, cal. 315 (8 mm.); France, the Lebel, cal. 315 (8 m.); Denmark and the United States, the Krag-Jorgensen, cal. 30 (7.6 mm.); Germany, their Mannlicher, model 88, cal. 31 (7.9 mm.); Belgium and Turkey, the Mauser, cal. 30 (7.6 mm.); England, the Lee-Metford, cal. .303 (7.7 mm.); and Switzerland, the Schmidt (7.5 mm.); Spain, the Mauser, cal. .283 (7.2 mm.); and the Netherlands and Roumania, the Mannlicher. cal. 25 $\frac{1}{2}$  (6.5 mm.).

While the average weight of these guns is 8 pounds, that of the Springfield was 9.30 pounds; the weight of the cartridge is between 22 and 28 grammes (340 to 431 grains), compared to that of the Springfield of over 1200 grains. The average length of the bullet in the modern rifle is 30 mm., somewhat greater than that of the Springfield, but the weight is only 232 grains to that of the late weapon of 500.

It will be seen from this condensed statement that the length of the bullet of the modern weapon is nearly four times its diameter, the weight less than half of that of the 45 calibre, the velocity more than one-third greater, and a range nearly double. As to the material of the projectiles it was found desirable to increase the hardness of the lead with 10 per cent. antimony without great loss of the specific gravity necessary to give the proper energy. This metal, however, would not take the rifling with the enormous velocity and the shorter curves of the modern gun, and it was found indispensable to cover it with a thin jacket of harder metal, for which steel, copper, and nickel, or their compositions, were found best adapted. From a surgical point of view this had the very desirable effect of preventing the great deformation sustained by the former projectile on sudden arrest of energy.

After these introductory remarks, concerning the weapons we are dealing with, their history and reason of existence, it is desirable that we consider in the shortest possible manner the theory of their effect.

I have hinted above at injuries produced by the Chassepôt, which led to accusation of the violation of the Geneva Convention. The Chassepôt was not yet a small-calibre rifle, although its bore was much smaller than the older types. At certain ranges it was found that with a relatively small entrance wound

there was connected a large cavity of destroyed tissue. This resembled very much the effect of the so-called Express rifles which were prohibited in the Geneva Convention. In the Express rifle the bullet has a point of hard metal, and its body, composed of soft lead, is hollow. On striking a bone the point loses velocity, while the body, being softer, expands in all directions and causes enormous destruction. This result was under certain conditions achieved by the French service rifle, but it was found that if there was deformation of the projectile it was in no proportion to the terrible wound produced. This led to vast numbers of experiments and investigation to determine the cause of this peculiar injury. Deformation of the bullets, formation of indirect projectiles produced by the impact of the ball, rotation, fusion, have been the principal explanations attempted, but they have all been more or less conclusively disproved. The explanation which is now generally accepted refers this action to a lateral effect, in addition to the wedge-shaped one of the bullet. It is the result of impact at a velocity which is too great to permit the lateral displacements imparted to the circumference of the perforation, and communicates the shock in all directions as far as the continuity of the object extends.

This effect is a two-fold one—hydrostatic when liquid or semi-liquid parts, such as brain or liver or a filled heart are struck, or a direct transmission in very compact tissues, such as the brittle parts of bones. It does not depend on deformation of the bullet, consequently the jacket of the new projectile and its preservation of shape are no protection. The principal factors are velocity and diameter of the missile. As the old bullet had a greater diameter and the new one a greater velocity, they seem to compensate each other, and the explosive effect of the two projectiles remains the same as to effect, but, unfortunately, is carried still further by the new one, as we will see later on.

The beautiful experiments of Prof. Kocher, of Berne, have greatly contributed to the elucidation of the subject. His firing was done on glass plates, rosin, metal, stone, clay, and soap plates, also on tin cans with various contents. It is impossible, with the space at my command, to detail these very interesting and conclusive experiments, but it is important that mention be made of the effect of high velocity, as this is the key-note of the practical deduction as to the effect of the small calibre rifle on the surgery of future wars. In his experiments on glass plates

he demonstrated that a comparatively low velocity causes a perforation of about the diameter of the bullet, with radial fractures; the higher the velocity the greater the opening, the more pronounced the comminution of the immediate surroundings, and in place of the radial cracks numberless concentric fractures, intercommunicating with each other, run over the whole plate of glass.

Plates of soap or lead, with low velocity, showed a plain perforation, while with high velocity the whole was many times the diameter of the calibre, without loss of weight, simply by lateral compression. Lumps of clay presented, with low velocity, a simple perforation; with high velocity, a small entrance and exit opening, with a fusiform cavity, in the centre of which the greatest width was nearly the size of a fist. The effect of this lateral pressure on fluids was demonstrated by firing on empty tin cans, or cans filled with dry substances, with the result of an opening the size of the missile, while cans filled with fluids burst in every direction. These are a few of the most striking experiments, showing that the explosive effect of a bullet increases in direct ratio with its velocity, and that, *ceteris paribus* the gun which imparts to its missile the highest velocity will exhibit the most destructive effect.

The modification caused by the diameter has been mentioned above.

As to deformation of the projectiles, while no doubt a flattened bullet has a broader point of impact and will lead to greater destruction, numerous experiments on glass plates, etc., have shown that when copper or steel bullets are used, which are not subject to deformation, the explosive effect was still apparent when the velocity reached a certain point.

The formation of indirect projectiles in the body, as by detached pieces of bone, while no doubt such is frequently the case at any range, when a bullet has sufficient penetration power, does not explain the enormous destruction, which only happens at certain ranges and always under certain circumstances, without a necessary increase of the impact by detached pieces of bone.

The centrifugal action assumed to be produced by the rotation of the bullet has long been believed the cause of explosive action. Unfortunately for this theory, this effect was observed with round balls propelled from smooth-bore guns whenever the velocity reached a certain degree. Another circumstance tending

to disprove this theory is that although in the modern rifle the bullet makes 2500 revolutions in a second, its velocity is such that in a flight of three feet, approximately, only four revolutions are accomplished, and it would therefore perform but a small part of one on striking the human body.

The fusion of the lead and the scattering in all direction of the molten particles has been given as another explanation. Positive experiments, with careful thermometric measurements, have shown that the bullet, while it is heated in its passage through the barrel of the rifle, never acquires the point of fusion thereby. The theory had its origin from the observation that the bullet, on striking iron plates or stones, becomes heated to the point of fusion. This, however, is due to the sudden arrest of its energy and its transformation into heat under well-known physical laws. Such an arrest does not take place in the human body unless the velocity of the bullet is greatly reduced, when the transformation into heat is not sufficient to cause fusion, not even scorching.

I have given so much time to the so-called explosive effects observed since the introduction of rifled muskets, with their resulting increased power of penetration, due to the velocity of the projectile, because they are the ones which produce the terrible injuries which have in the wars subsequent to this change of armament littered the battle-fields with the dead, necessitating mutilating operations in the hospitals, and filled the pension lists with the names of thousands who lost their limbs. Was it not natural, when the civilized nations found it desirable to reduce diameter and weight of their rifle bullets, that a shout of relief arose from those who saw therein a reduction in the horrors of war—a simple small perforation which would heal almost like a subcutaneous wound, and when this belief was supported by apparently correct experiments the hope became a certainty? Unfortunately, this hope appears to have proven utopian. The experiments which appeared to support it lacked two essentials: first, the enormous velocity; second, the objects on which the experiments were made did not resemble the tissues which were supposed to have so fortunately escaped the cruel effects of the former large projectiles.

The difficulty of striking with any degree of certainty the parts of animal tissue on which experiments were made to ascertain the injuries produced by the modern rifles, the great incon-



venience of finding room enough to fire at actual distances, and the great cost of such experiments led most observers to fire with reduced charge and at correspondingly reduced distance in order to obtain the final velocity which the projectile would have obtained if full charge had been used on actual distances. It was believed that in that manner a similar effect would be obtained. The laws of ballistics, under which this assumption was made, date, however, from a time when the projectiles had one, two, or at most two and a half times the length of the calibre, and it appears doubtful if they can correctly be applied to the modern rifle, with its bullet of four or more lengths and its enormous velocity. The other cause of error was due to the fact that the experiments were made on dry bones, the walls of which readily receded from the wedge-shaped impact, and consequently facilitated the so-called humane results, while the hydrostatic effect essential to explosive action was lacking, owing to the absence of the liquids, which in the fresh bone fill every interspace, and thus make a lateral escape of molecules impossible within the time called for by the passage of the projectile.

The only observers who have made these experiments at actual distances, at least in a sufficiently large number to give them some show of conclusive force, are Demosthene, of Bucharest, and the German Commission under the auspices of the German Emperor and the direction of Surgeon General von Coler. These two have come to the same results, and a more detailed account of the latter series of experiments will suffice to enlighten us as far as artificial conditions can do it. The actual distances were from 25 to 2000 metres; the number of hits over 1000. The anatomical objects were fastened to a wooden frame and enveloped in sheeting to obtain information on the penetration of vestments. The closest approximation to living tissue was attempted by injection of fluid into the tissues and of animal blood into the blood-vessels. The preparations were then frozen and the wound channels filled with "Wood's" metal, thus fixing the contents of the wounds in their position.

The following were the results :

As to deformation of the bullets, it was observed in 4.5 per cent. of the hits, taking all of them into consideration ; if the hits on bones alone were considered, the percentage would be much higher. The forms of deformation were simply flattening of the point on the side or basis, with or without tearing of the jacket,

up to entire loss of the jacket, with absolute destruction and disruption of the projectile. The greatest degree of deformation was found up to 1200 m., and it did not disappear up to 1600 m.; from which distance they exhibited only more or less flattening. No deformation was caused by passage through soft tissues; the greatest degree resulted from impact on the long bones. No conclusion can be drawn as to the distance of a shot from the deformation of a missile, as the degree of resistance varies in nearly every case. Whenever deformation took place the injury to bones and soft parts was in every way similar to those produced by the enormously deforming lead bullets of former large calibres.

As to the penetration of the projectiles and their arrest in the body, it was observed that only four times undeformed ones were arrested, and at a distance of 1600 to 2000 metres, and twelve times deformed one. In forty-six cases of deformation parts of the jacket and pieces of lead remained in the body. In 12 per cent. of the cases part of the sheeting covering the wound was carried in. As to lateral impact, it occurred frequently in consequence of unequal resistance of the tissues, and when several bodies were struck by the same bullet it rarely retained the direct flight, and the injuries caused were then dependent on the width of impact and remaining energy. If this latter was considerable, then a combination of rotation and pendulum motion caused destruction similar to explosive action.

As to the wounds produced, the results were as follows:

Wounds of entrance of the skin greater at short ranges, mostly smooth, largest in lateral impact. Wounds of exit greater than the corresponding wound of entrance, and more regular. At close ranges they were found very large, when a bone adjacent to the skin had been comminuted. In muscles smooth, straight wound channels, at close ranges as large as the calibre, at great ranges smaller. Greater destruction was produced only when the projectile met resistance, was turned, or struck with lateral impact. The smaller blood-vessels were torn, the larger ones rarely struck; when this happened the injury to the intima was greatest. Complete division of the larger vessels only at close range. In the heart simple perforation in systole, extensive destruction in diastole. The lungs exhibited a narrow-wound channel, the walls of which were infiltrated with blood. The liver was always greatly injured, extensive pulsification at close ranges. Explosive action evident yet at a range of 2000 m. (with a velocity of 170 m.) The spleen

suffered in the same manner. Stomach, intestinal tube, bladder, had on an average three perforations, maximum eight; size between 3 and 110 mm.; shape of wounds generally round. (The cases observed among the living have always proved fatal.) In gunshot wounds of the skull explosive action at close ranges, generally decreasing with longer range. At a distance of 1000-2000 m. (velocity of 200-170 m.) simple perforation, and finally at a distance of 2700 m. arrest of the projectile in the cranial cavity. The brain was extensively destroyed in shots at close range; at longer ranges the wound channel was narrow.

Effect on bones: At a distance of 100 m. (566 m. velocity) the diaphyses were comminuted into small fragments, the epiphyses likewise, sometimes connected by the periosteum. The same results at a distance of 200 m. (500 m. velocity) with less destruction of the soft parts; at 400 m. similar result, with less comminution of bone. At 600 m. range simple perforations were found occasionally with radial fissures of the epiphyses. The destruction of the shaft remains, however, as severe as at shorter ranges, but with a lesser cavity behind the bone. At 800 m. simple perforations become more frequent in flat bones and the epiphyses. At 1000 m. the destruction of the shaft of the long bones remained still the same; in the femur splinters 11 to 15, in the humerus 6 to 18 cm. long, but they were less numerous and were connected by the periosteum. The spongy bones exhibited simple perforation. At 1200 m. the splintering continued. The same at 1600 m., with less displacement of the splinters. The same injury in the shaft of the bones continued at a range of 2000 m.

We may state as a *résumé*, that the comminution of the shaft of the long bones was about the same at all ranges, the splinters at close range being smaller, more numerous and less connected by periosteum, while at long ranges they were less numerous, larger and connected. Up to 700 m. the cavity caused by the comminuted bone reached the skin wound of exit; after that becoming smaller, and ceased at 1600 m. The spongy bones and ends of the long bones were comminuted up to 600 m., after which simple perforations began, and after 1000 m. became the rule.

This is probably what we will have to deal with in future wars—simple perforations in wounds of the soft parts—severe bone injuries, as a rule, involving the whole bone, except where the

epiphyses are struck and then only at a range of 600 metres and over.

Thus far the experiments of the German Commission. As to their correctness: It is admitted that there may be a difference in the reaction of living tissues and that some of the conclusions arrived at by these observers may not prove absolutely correct. The objections made by some sensational writers that an entirely different state of affairs will be found when living bodies are struck instead of "half-rotten dead tissues" do not hold good. The parts experimented on were well-preserved specimens, and as mentioned above, prepared so as to resemble as far as possible living tissues.

Next to the degree of injury inflicted we will now have to consider the relative frequency of wounds and find that with the modern rifle troops are brought much sooner under fire and with a weapon where the curves of the bullet do not call for an absolutely correct estimation of distances, which is so necessary with a shorter-range weapon, consequently have to meet greater accuracy of fire. Owing to their lighter weight, a larger number of cartridges can be carried by each man, and methods of replacing the ammunition expended by rapid firing will be so perfected that troops within firing distance will have to meet a perfect hail of bullets, and if of equal ability to stand killing, their end is likely to be that of the "Kilkenny cats."

Joking aside, if we consider that with the modern repeating rifle 40 shots can be delivered in a minute with fair accuracy and up to a range of 6000 yards with a remaining velocity sufficient to perforate an abdominal cavity, we may well consider the estimate of the German Commission and other authorities of a loss of 20 per cent. of the troops engaged a moderate one—only an increase of 5 per cent. over the experiences of other wars.

From the numbers of experiments as to the percentage of hits made on silhouettes I select two to illustrate particularly the enormous rate of casualty. If we only admit one-tenth of these hits for actual warfare we still have a percentage far exceeding that of the older weapon. For those who are not acquainted with the modern styles of targets I will explain that a silhouette is the front presented by either lying-down, kneeling or standing footmen, or in cavalry the front in advancing or side view. The outlines are represented by an iron frame, with canvas stretched between.

The first is the firing of a war company of 220 men at Châ-



lons; the target was composed of 204 silhouettes, mostly in a kneeling position. The firing was commenced by sections at 1350 metres, estimated by the captain, with 21 hits at one volley. The company advanced to 800 metres, firing volleys by sections, with 62 hits. Firing at will to 400 metres, with an average of 4 shots, 96 silhouettes were struck. After that rapid fire, with 203 silhouettes struck, the captain of the silhouette company, who was standing, received 47 shots. The total shots fired, 6500, hits 1887. The magazine was not used.

The second experiment selected was carried out at Hythe.

Thirty-eight men in two squads were concealed on a hill, at an estimated range of 2300 yards from the sea. Each squad fired five volleys at a supposed landing party. The bullet struck about 20 yards from the shore and covered a space of 50 square yards on the water. The rapid volleys were then fired at an estimated range of 1850 yards, the target being 220 silhouettes, representing two companies in attack formation, with 6 guns and 18 gunners; 58 hits were made. Ten volleys were then fired at 134 silhouettes, range 1400 yards; result, 113 hits.

These two examples must suffice to convince you of the accuracy of the new rifle at enormous distances, with a corresponding large number of casualties.

As to the character of the wounds, I quote Sir William McCormack in an address on "Some Points of Interest in Connection with the Surgery of War." Speaking of the recent Wazaristan expedition, that of Chitral, and the storming of the Malakand Pass, when the new rifle was used by the English, he says the volleys wrought great havoc in the enemy's ranks. The factors which determined the amount of damage inflicted by a gunshot wound were the unalterable form of the projectile as well of course as its size, the velocity on impact, and the resistance of the tissues struck. Hitherto about nine-tenths of the wounded on a modern battle-field were disabled by rifle bullets, and the proportion would not diminish with the use of magazine rifles firing some 60 shots a minute and carrying immense distances. During the last twenty years there had been a gradual diminution of the calibre of the rifle and in the weight of the projectile, while its hardness had been greatly increased. The explanation of the extraordinary development of explosive effect seemed to depend on the rapid arrest of the flight of the bullets on piercing fluid matter, and its motion being transferred to the parts im-

mediately surrounding it, and these again transmitting it to parts further removed, just as wave circles were produced by a stone dropped into the smooth water of a pond. The 900 experiments made by the German War Office did not justify Bruns's classification of gunshot injuries into groups or zones according to range. As the range increased there was a gradual diminution in the velocity and energy of the projectile, and a corresponding diminution was observed in the extent of injury.

I have quoted here Sir W. McCormack, one of the highest authorities on military surgery, *verbatim*, as he unexpectedly corroborates the views expressed by me in the various papers published on the subject before we had the indubitable proof of the latest experiments. Volkmann, in a paper communicated to the first Congress of German Surgeons, pointed out the subcutaneous character of gunshot injuries of bones and joints of the modern rifle, which made them less dangerous than the compound fractures, with more extensive injury to the soft structures sustained from other causes. The same observation was made by Pirogoff, who was astonished at the easy manner the wounds produced by the small Circassian bullet healed during the Russian war in the Caucasus. This, of course, refers only to the diameter of the bullet, irrespective of velocity. During the recent war in Chile Dr. Still found that flesh-wounds imparted by the modern rifle bullet, if not infected by probes, readily healed under a scab, that the favorable character of lung-wounds was especially noticeable, and that the bones were less comminuted, and united in about half the time formerly required. Dr. Rivero, of Valparaiso, had made similar observations.

Surgeon Borden, of the English army, reports from the Chitral campaign, as far as he had seen himself or heard from others, that the wounds through the soft tissues at both short and long ranges were clean and incised, with very little or no bruising, and that they quickly healed. Through the bones clean punched-out holes were made with little splintering, and he said in no case was there explosive action. (He probably did not see the latter class of cases, as they were mostly of fatal character, or else the firing was done beyond 600 yards.) He also states that the number of wounded in proportion to the number engaged and actually under fire was larger. He thought we were justified in believing that the next great war would be more destructive to human life, and that the number of injuries, and in

many cases the severity of the injury, would be largely increased, but very many cases would remain less severe in character, more capable of successful treatment, and less likely to entail future disablement, while improved sanitation and antiseptic methods would enormously increase the proportion of recoveries.

We have now arrived at the point where we may consider the sphere of the military surgeon under the new conditions laid down by the change in the rifle. In order to proceed chronologically, we will first look into the question of the care and the removal of the wounded on a typical battle-field, one of the great problems of military surgery. Our time will not permit the consideration of the ever-varying conditions of advantages offered by protection of ground.

If the lesson conveyed by the Chinese war (in which, as reported by the French military attaché, four per cent. of the total killed and wounded of all grades were doctors) is not to be lost, we will have to make a radical change in the disposition of medical officers. (He attributed it exclusively to the longer-range arms of modern times. He further states that the question of protecting ambulances in the event of a European war is one that calls for immediate attention, for under existing conditions the carnage could not but be enormous.)

If the number of injured was only 20 per cent. and 4 per cent. of these were surgeons, there would have to be a supply of eight surgeons to a regiment of 1000 men to furnish the necessary quota of casualties, and there would be none left to attend to the wounded. This enormous proportion is evidently due not only to the presence of medical officers on the firing line, but to the proximity of first-dressing stations. In order, therefore, to have a sufficient number of medical officers to attend to the wounded after a battle they should be kept out of the firing line, and the first-dressing stations should be at least 3000 yards behind it, unless some favorable condition of the ground permitted closer approach. The removal of wounded should not take place until the firing line is removed to a distance of 3000 yards, or the firing has ceased. In their transport to the first-dressing station not only the bearers would be greatly exposed, but the wounded themselves, and it would be better to instruct the men that when hit they would be safer in lying still than in trying to reach the rear. If general instruction was given to the men what to do in case of hemorrhage, the wounded on the line of battle could dur-

ing a lull in the fight be succored by their comrades to prevent at least death by hemorrhage.

If the percentage of severe injuries arrived at by the statistics of Fischer in the Franco-Prussian War is correct, then we may calculate that at least 30 per cent. will have to be carried off the field, and that the remaining 70 per cent. of the men with flesh-wounds will find their way to the dressing station. These 30 per cent. of the 20 per cent. in a division of 10,000 men would be 600 for whom transportation would have to be provided. Assuming that even 2000 yards were considered sufficient distance for the first-dressing station, it would take each litter, allowing 8 minutes for refreshment of the wounded, dressing and loading, 44 minutes for the trip to the dressing station, 15 minutes for unloading and rest of the bearers and delays, and 20 minutes for the return to the firing line, one hour and a half. In five trips, the limit of endurance of the bearers, five wounded would be removed, or 120 stretchers with 480 bearers will have to be provided for to remove the 30 per cent. of the 20 per cent. of wounded needing carriage for a division of 10,000 men, or nearly five per cent. of the entire force, for bearer service alone, not counting the men of the sanitary corps needed for service in the field hospital and the ambulance service. This would necessitate either a very cumbrous hospital corps or a neglect of the wounded, or extensive assistance of the troops of the line.

The first-dressing station should, therefore, during the actual fighting expect to succor only those who by themselves find their way to them and casual cases happening within safe range. No attempt should be made to evacuate the wounded from the battle-field until the close of the fighting, or sufficient advance of the line of battle; then the first-dressing station pushed to the closest possible vicinity, the wounded collected, the dressing applied, and the most necessary operations performed.

The collection of the wounded, in order to still more shorten the time of their exposure, should be performed by the reserves, or any troops not engaged in the fight, if there are any, and for this purpose all enlisted men should receive a limited instruction in first aid and litter service, so as to enable them to apply an occlusive bandage, a splint, and properly lift the wounded. Each man, as provided in the German army, should carry some form of first-aid packet. In order to have it handy at all times it should be reduced to the lowest possible size, and instead of



being carried in a pocket, where it would be liable to soiling and infection, it should be attached to the cartridge belt. To facilitate the rapid clearing of the battle-field each division should have with its ambulance wagons, in addition to the 120 stretchers needed for ordinary transport, an additional supply. The former should be a component of the ambulance train at the field hospital and pushed to the ambulance station at the proper moment. The latter should form part of the train of the division hospital and join the field hospital on proper notice.

Unless a particularly safe location can be found for the field hospital, it should be established out of range of field artillery and the extreme range of the modern rifle, or at least 8000 yards from the firing line, for nothing interferes as much with the comfort of the sick than, in their weakened and relaxed condition, apprehension of further injury. If circumstances permit, a section of the field hospital, with its cooking apparatus, may be advanced nearer the abandoned firing line, and the former hospital as rapidly as possible evacuated into the division hospital. The field hospital, in view of the great front occupied by the open formation of the troops, should be a brigade hospital.

As to the actual surgery called for by the new condition of affairs, we will have a large number of flesh-wounds, which, after reception of their occlusive dressing on the firing line before removal, will only need verification of the dressing, rest, proper position, and in case of further transport, splints to lessen spasmodic action of the muscles. Injuries of the bones at close range will be of a severe character, but owing to their usual small skin opening, may be treated in a conservative manner. Plenty of material for plaster bandages should be on hand at the field hospital to obtain the immobility necessary to make removal to the rear possible without undue pain or irritation by the fragments. It is not to be expected that cases of injuries to the bones will be able to return to the fighting force within the time future campaigns will probably occupy, but eventual recovery, without loss of the limb, and retention of at least partial usefulness, may be looked for.

In order to make this conservative surgery possible, reserve supplies of splinting material and dressings should far exceed any supplies heretofore provided, and the replenishing from depot to division hospital, from this to the brigade hospital, and from this to the first-dressing stations should be entrusted to the most ac-

tive and energetic officers. Injuries to the joints will, if asepsis can be maintained, owing to the little explosive effect caused by their spongy tissues, recover under conservative treatment, and resections will practically be banished from military surgery. With the smaller number of cases calling for mutilating operations, an attempt may be made to perform laparatomies, even in the field hospital in perforating wounds of the abdomen. With the ever-increasing training in the technique of asepsis, the dangers of these operations, even under unfavorable conditions, will be lessened, and a chance of life given when otherwise certain death would be the unavoidable result.

The need of medical assistance on the firing line to arrest hemorrhage is one of the bugbears which modern statistics have laid on the shelf. Out of 87,822 wounds tabulated in Circular No. 6, Surgeon General's Office, of 1865, 44 gunshot wounds of arteries were registered, or 0.05 per cent. Since from the experiments of the German Commission it is shown that injuries of large arteries are rare with the modern rifle, and they of necessity being fatal, especially as the hemorrhage is usually internal and cannot readily be recognized, the hemorrhage calling for treatment will usually be confined to the smaller vessels, which will probably be arrested either spontaneously by the lessened pressure resulting from shock and loss of blood, or by an occlusive bandage.

I regret that as to the possibility of maintaining asepsis I have to remind you of that part of the statistics of the German Commission which show that even with the thin sheeting covering the anatomical preparations shot at, in 12 per cent. this material was carried into the wound. This was confirmed by Dr. Yberra, of the Chilean army, who found that the steel-jacketed bullets of the Mannlicher rifle, in use during the Chilean war, frequently carried fragments of clothing into the wound, and when they were not carefully removed they caused persistent suppuration, which frequently necessitated secondary operation. This was, however, not the absolute rule, and even in the days of the Russo-Turkish War, when asepsis was not so well understood as to-day, it was found that pieces of clothing, in perforating wounds of the knee-joint, failed to cause infection. This chapter of infection by clothing is being now actively experimented on, and I may have the pleasure in a number of months, when conclusive results have been arrived at, to communicate a paper on the subject.

There is also a difference in the shape and size of the particles of clothing carried into the wounds, between the soft-lead, easily deformed bullets of the old-style rifles and the jacketed ones of the present day. In the former the fragments were of considerable size, while the latter line the wound channel, with a fine film of fibres, which, while they may be bearers of infection, will not act in the same degree as irritating foreign bodies. Frankel, in his experiments on animals, found that infection only took place when cultures of streptococcus or staphylococcus were inserted with clothing into the wounds. Pieces of soiled linen, cotton and wool cut from the clothing of soldiers and placed in subcutaneous openings produce no ill results. It is therefore probable that the infection is generally a secondary one, and that the fragments of clothing only serve as culture beds, not having the ability of living tissues of destroying microbes.

The practical deduction from this may be that no search should be made for clothing carried into wounds, lest secondary infection be started, unless such infection has become apparent. Another practical lesson may be derived,—*i. e.*, that there is more danger from dirty fingers and infected probes and forceps than from the contact of the clothing of the wounded, and that an occlusive bandage, generally brought from hospital supplies and handled by persons who daily are in contact with pus microbes, unless known to have been sterilized, is more dangerous than leaving the wounds uncovered. One of the great boons of the modern rifle is the rarity of arrest of the bullet in the tissues. This will do away with one of the most frequent causes of infection—probing.

# DESCRIPTION OF AN IMPROVED CAVALRY SKETCHING CASE, DESIGNED BY LIEUT. M. A. BATSON, 9TH U. S. CAVALRY.

BY CAPT. T. A. BINGHAM, CORPS OF ENGINEERS, U. S. ARMY.

THE improved cavalry sketching case, as designed by Lieut. Batson, is an instrument well worthy of attention from military men, or others, who have or may have road maps or reconnaissances to make, with contours.

It is based on the well-known and universally received instrument devised by Col. W. H. Richards of the British army. It has a number of improvements and refinements, however, which are not only ingenious but practical; and Lieut. Batson has had the good judgment to stop just short of complexity and over refinement.

This improved instrument is capable of great accuracy in such work as it may properly be used for; and increasing accuracy will result from practice. None of its parts are any more liable to be bent or broken than is the case with the instrument now in use. It has a convenient case for its protection and comfortable transportation.

## DESCRIPTION (*see plate*).

This improved instrument consists of a board E E, Fig. 1, about seven inches square—it may be larger or smaller.

On two sides of the board are fastened wooden side rails F-F and G-G, which are longer than the board, and which hold at their ends the trunnions of the tube-rollers F-G. These rollers carry sketching paper, which may be three to four yards long, and enable it to be pulled along across the board in either direction with any desired degree of tension—a great advantage. These rollers have longitudinal slits for receiving the ends of the paper and thus holding it in place, Fig. 4.

The ends of the side rails are slit like a clothes-pin and clamped by a clamp screw, which regulates the friction of the rollers and gives a fork that will not split, Fig. 2.

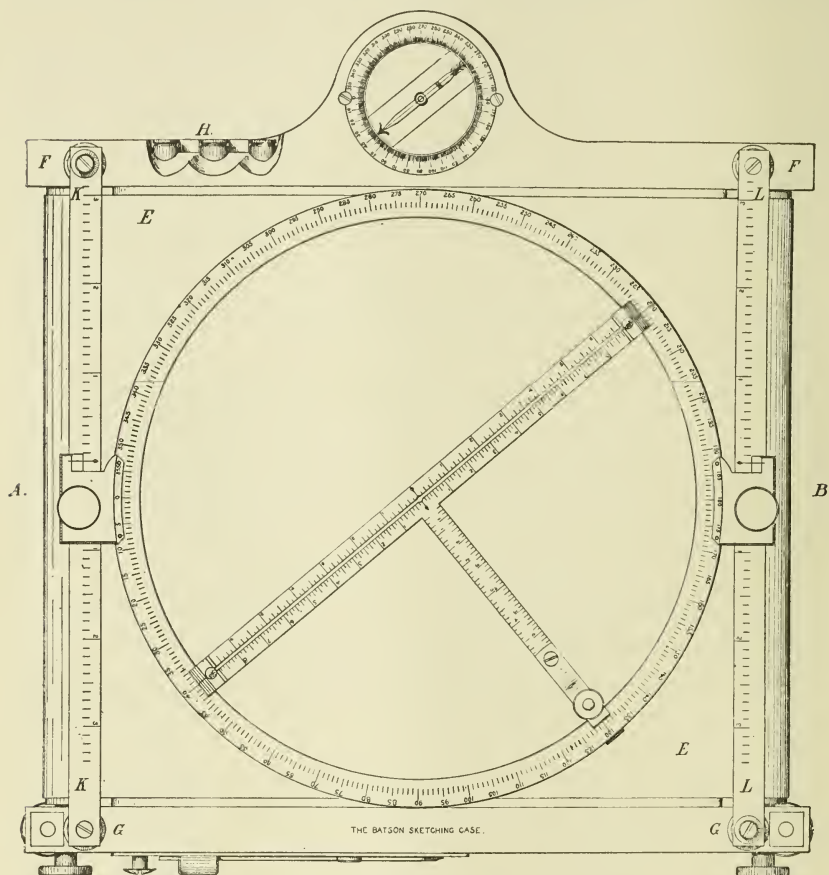
One side rail carries a compass having an adjusting and clamping screw-head on the under side, Figs. 1 and 4. The compass circle is graduated to degrees.

At H, Fig. 1, is shown the method of carrying the pencils



most in use, in the body of the board itself; and Fig. 4 shows how other drawing materials are stowed.

Parallel to each roller and above it is a metallic trolley rod or strip, graduated to inches and tenths, each way from the middle, K-K, L-L, Fig. 1. On these trolley rods and controlled by clamp screws slide the two metal cars of the metallic circular pro-



*Top View.*

FIG. 1.

tractor, which is graduated to degrees. Rods are preferable to flat strips because they obviate too much play in the motion of the protractor along them.

Inside the protractor is a metallic T-square which revolves about the centre of the protractor. The three ends of this T-square are grooved and engage the inner edge of protractor

circle. The long arm of the T-square has two different scales marked on it, one on each side, zero being in the middle. Several scales may be used with this instrument as constructed; they will be explained later. Longitudinally through the middle of this long arm is a slit which enables a pencil mark to be made perfectly straight through the centre of the protractor. This slit is at the bottom of a sort of trough beveled longitudinally along

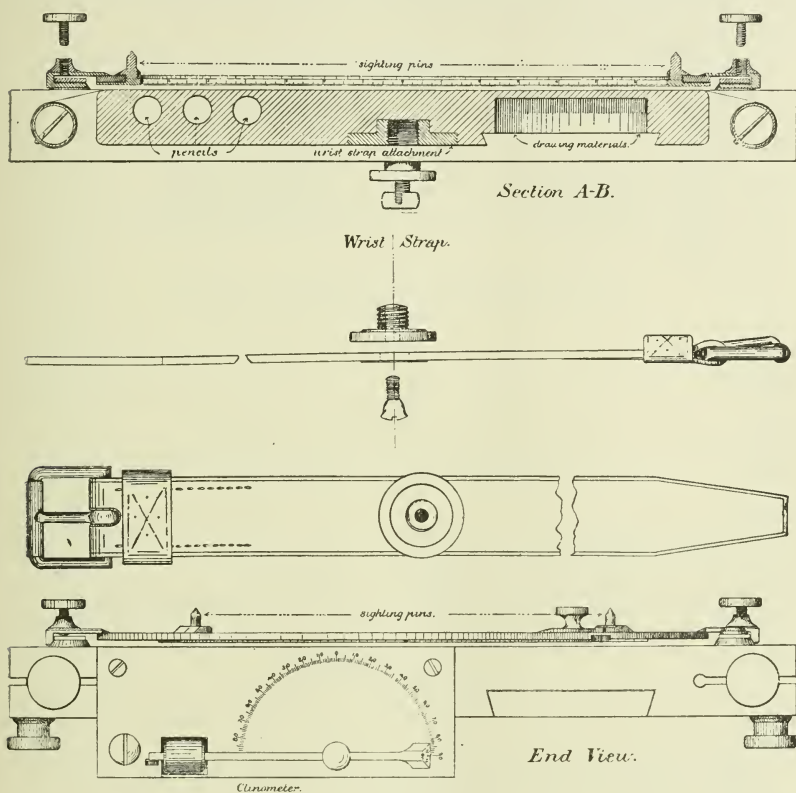


FIG. 2.

this long arm and sloping from the edges down to the middle slit. Hence the cross section of this long arm is approximately V-shaped.

At each end of the long arm projects a short sighting pin.

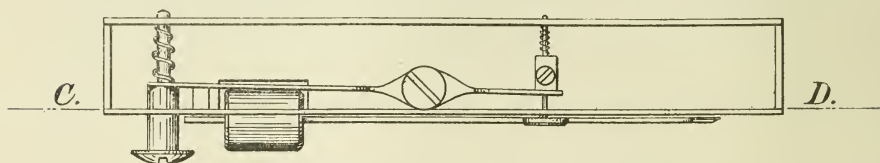
The short arm is graduated like the long arm, zero being the centre of protractor and long arm. It carries a screw at its end to clamp the T-square in any position.

The protractor and compass circles are preferably (but not

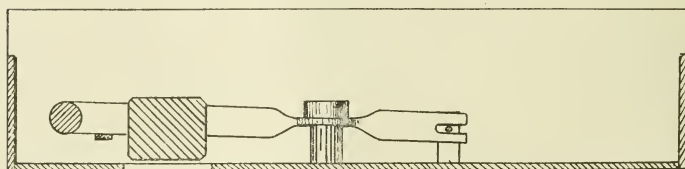
necessarily) placed with their zero diameters parallel, in order that readings of the needle may be easily and quickly transferred to the paper.

Since the motion of protractor and T-square is exactly at right angles to that of paper, their centres can easily be placed at any point on the paper; and since the T-square revolves about the centre of protractor (which always represents observer's station) it is easy to lay down accurate lines of direction by the aid of the sighting pins.

The clinometer is conveniently attached to what is preferably



*Interior View of Clinometer from above.*



*Section C-D*

FIG. 3.

the right hand side of the board when in use. It has a pendulum swinging in front of a graduated arc. When not in use, the pendulum weight is caught up out of harm's way; when needed, the pressure of a finger brings it in play. Pressure by a finger keeps the pendulum free while sighting along the board for slope. Removing the finger clamps the pendulum in any position, for reading the slope.

Any scale of horizontal equivalents is purposely omitted in order to allow such scale as may be desired to be written out and pasted conveniently on the board.

Of course the clinometer can be used as a level.

The entire instrument will ordinarily be carried strapped on the left forearm with compass circle to the left, Figs. 1 and 4. The milled head ends of the paper rollers will be to the right and hence perfectly convenient to manipulate.

Attention is called to the fact that these milled heads on the ends of the rollers are merely for turning the rollers and are not

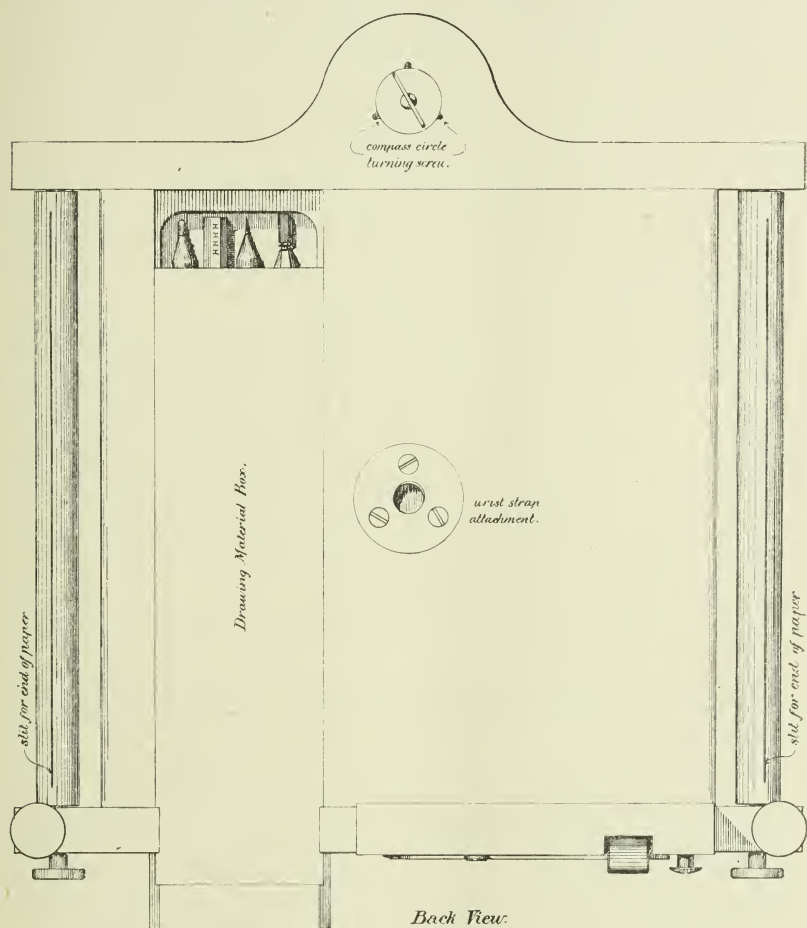


FIG. 4.

needed as clamps because the necessary friction of the rollers is obtained as above explained. Turning either milled head draws the paper toward that roller without the necessity of loosening the other roller. This is an advantage believed to be possessed by no other instrument of this kind.



## ADVANTAGES CLAIMED FOR THIS INSTRUMENT.

1. All the necessary instruments are combined into one, facilitating the use both of hands and instruments and preventing loss or mislaying of the tools needed for sketching work. Paper, pencils, ruler, compass, protractor and scales are always ready and in place for use in a manner most convenient and difficult to excel. The position of the paper no longer has to be changed with pins in the face of a wind or on a restless horse. It is no longer necessary to get a compass out of a pocket for a sight and then put it back. There is no need of holding pencils in the mouth or behind the ear. When a ruler is needed it does not have to be got out of pocket or bootleg and returned thereto; and so of other crudities of old methods. Besides, there is no danger that any of these necessary articles will fall to the ground as so often provokingly happens in horseback work.

2. Convenience in holding paper and much of it on rollers.

3. After use of ruler and protractor over a point representing a station, they can be clamped in position, affording accurate continuance of work exactly where left off—without the usual trouble of getting a separate ruler or protractor back into accurate position, as is often found necessary in former methods.

4. Parallel lines can be drawn accurately in any direction.

5. Arrangement for turning and clamping the compass box.

6. Attachment for wrist strap.

7. No unnecessary plotting lines which confuse and disfigure the original map.

8. When an object is sighted on along the ruler, the ruler may then be clamped—a great advantage on a windy day or with a restless horse.

9. Having finished at one station (which will be at zero on the ruler) the ruler can be sighted on the next station and clamped. Travelling directly toward second station any point or intersection on the line between the two is plotted along the clamped ruler by reading off the scale.

10. The ruler is so divided that six or more scales may be used, thus

8 inches	to	one mile.	Smallest division	=	12½ yards.
6	"	to	" " " "	"	" = 12½ "
4	"	to	" " " "	"	" = 25 "
3	"	to	" " " "	"	" = 25 "
2	"	to	" " " "	"	" = 50 "
1½	"	to	" " " "	"	" = 50 "

11. Safety and convenience in transportation and in use.
12. Capacity to produce a map complete at any instant and ready for instant use.

## ANSWERS

to some objections which have been urged against Lieut. Batson's instrument.

1. That its cost is too great, viz., about \$15.00.

*Answer.* What is the limit of cost?—and by what authority is this limit set?

A good field-glass cannot be bought for less and yet that price is not regarded as prohibitory. Moreover, it is not necessary that every officer should have the instrument as his private property, while it is that he should have a good field-glass. The instrument is one which combines all that is necessary for doing good and reliable reconnaissance work, all in one piece, easily carried in a pouch over the shoulder, no heavier than many field-glasses in general use, ready for instant service and able to turn out a completed map (in colors if desired) ready for use as soon as the observer returns, requiring no after work.

It is not as expensive as an officer's cavalry helmet or a Staff chapeau and equals in cost less than that of two foreign textbooks such as Hamley's "Operations of War."

The instrument combines several which must otherwise be had separate. Finally, this instrument raises the grade of work done by it over that done by former methods into the limits of real trustworthiness and accuracy, a result well worth a little extra first cost.

2. That there is no use for the two graduated circles except to aid in putting the meridian on the paper, which is as easily and accurately done with a detachable ruler.

*Answer.* The very object of this improvement is to do away with detachable or separate tools which are a disadvantage if they can be, with equally good results, dispensed with. When such a separate tool has to be held in place by the hands it cannot always be used with as accurate results as if it formed part of the board itself and were capable of being clamped in any position.

The objects of the large circle are

(A.) To afford means of obtaining universal motion in the ruler, and the Batson method would seem to be better than the other devices.

(aa) because, with the Hamilton device or a detachable ruler, it becomes necessary, in order to sight on an object, to watch the dot on the paper representing the observer's station and keep the edge of the ruler adjusted upon it, not always an easy matter.

But with the Batson instrument, having adjusted the zero of the ruler to the station and clamped the large circle, the ruler then simply rotates about a centre representing the station and the observer can sight to all objects desired without paying further attention to that dot.

(bb) Having sighted towards an object, in order to lay off its distance by the Batson instrument, it is only necessary to place a dot opposite the division on the scale representing this distance, because the zero of the scale is at the observer's station; whereas, with the Hamilton device or detachable ruler a line must be drawn along the edge of the ruler, the zero of the scale set to the observer's station and the distance then marked off.

(cc) An object having been sighted and the ruler clamped (which is so easily done that no time is lost), a line can be drawn without displacing the ruler. This is a great advantage on a windy day or with a restless horse. This convenience is not afforded by a detachable ruler nor by the Hamilton device.

(B.) To give a protractor ready for use without further trouble, for turning off angles, plotting compass readings, etc. This is a great advantage, arising from the use of a circle for the purpose above described.

3. That the scales of yards on the ruler, three inches and four inches to the mile, are seldom used in the field or only used for sighting to a side after estimating distances (the sentence is a quotation whatever it may mean); and that these scales require a step to be called a yard whether walking or trotting, and then that the proper representative fraction be calculated.

*Answer.* The scales of three inches and four inches to the mile need not be used if not desired. The ruler carries scales of six inches and eight inches to the mile, and the first two mentioned are merely extra optional scales that *may* be used. It is possible to use the ruler for several different scales—see under head of “Description.”

The scales marked on the ruler read to  $12\frac{1}{2}$  yards. If distance

is to be measured by paces or steps, it is only necessary to determine the number of paces or steps taken in 100 yards. For example, suppose a horse takes 52 alternate steps in 100 yards; then for each time 52 is counted record 100 yards.

4. That there is so much play in the parallel movement of the protractor that it fails to give accurate results after getting the direction and then attempting to transfer the sighting so as to pass through the occupied station.

*Answer (a).* Since this objection was made the parallel motion has been improved, so that play is reduced to a minimum and will give less error than is possible with detached instruments.

(b) Parallelism can in any case be obtained by setting the clamping ears of the protractor on corresponding graduations at each side.

5. That the clinometer is merely an assistance in guessing, and that practice soon enables an observer to "guess" with sufficient accuracy; and that, while the graduated arc reads to ten minutes, it is farcical to expect that degree of accuracy in its work.

*Answer.* If "guessing" be sufficient for the work, no instruments at all are necessary; for practice will undoubtedly develop great skill on the part of an observer. But, as said before, this instrument is intended to introduce a considerable degree of accuracy and reliability in the record obtained by its use, and the clinometer is so attached and can be so used as not to increase the probabilities of bending or breaking.

Suppose the clinometer does become unserviceable; why, its use can be discontinued without interfering with the use of any other part of the instrument and the "guessing" process can be relied on.

The fact that the new rifle of the army is sighted to 1900 yards doesn't mean that it has to be used at that range, and it is "farcical" to suppose that any accurate results can be obtained at that distance. Yet it is not regarded as "farcical" to have the rear sight graduated for that range.

So with this clinometer, while it is graduated to ten minutes of arc, and while with care great accuracy can be obtained, it is not expected that such a degree of refinement will usually be attempted. Yet it is better to have an accurate instrument than a coarse one, if the former can be carried and used as well and read as quickly as the latter, which is the case with this instru-



ment. Moreover, it can be used without turning the board over.

6. That the protractor must be moved to one side in order to fill in details.

*Answer.* This is equally true also of all detachable rulers and of the Hamilton device, with the addition that a detachable ruler must be returned to pocket or bootleg.

## PROMOTIONS IN THE NATIONAL GUARD.

BY CAPTAIN R. U. SMITH, VT. N. G.

THIS subject, it seems to me, is one of importance to the welfare of the National Guard. National Guardsmen receive practically no pay for their services, at least not enough to compensate them for the time employed. Frequently, too, their expenses are greater than the pay received.

The men not being well paid, some inducements must be held out to obtain recruits, and, also, to keep them in the service.

Good men are wanted for the National Guard,—it is necessary to its welfare to have them. When a good man enters the service, it is an advantage to keep him.

Our system of giving veteran badges for length of service furnishes an incentive to the men to stay in the National Guard.

One strong motive which prompts men to join the National Guard is the hope of promotion, and nearly every good soldier looks forward to a promotion as an inducement to him to continue his service.

A few years ago officers were elected, the line officers by the men, the field officers by the line officers, etc.

This system was pernicious. A man might be an excellent soldier, worthy of a high position, and yet, as is always the danger in elections, be passed for some more popular man.

I have in mind several instances where men who have had a special military training have entered the National Guard service, stayed a time, and left because after serving a few years, others who were not as well entitled to promotion on the basis I am about to propose were promoted, while they were passed by.

We have taken a long step in the right direction by subjecting the men who are elected to examinations, thus placing some

check on the persons who are chosen, but this method does not insure the best men for officers, as it is only necessary to elect men who can come up to a certain standard.

Appointments might be desirable, were it not for the fact that wherever appointments are made, unless they are made as the result of a system of markings, favoritism is almost sure to creep in, and even if no favoritism is shown as a matter of fact, it is quite apt to be alleged, thus causing dissatisfaction.

The best men in the service should be the ones chosen for officers and our present system of promotions is not one that tends to produce that result. How shall we attain that end?

Have an examining board; when a vacancy occurs, let the candidates for the position pass a competitive examination on military subjects, and let the examining board mark the candidates on that examination.

Faithfulness should be rewarded; to secure that end, have the records of attendance examined, and have percentage of attendance enter into the computation. No one, I think, will be disposed to deny the right of a man to a promotion whose military knowledge is superior and who is regular in his attendance, if anyone is to be promoted.

Let the board average the marks obtained as above, giving each its proper weight, and let the promotions be made on that basis.

Merit should be recognized, and an examining board has generally no interest, except to get the best men for officers.

More good men will enter the National Guard service, and, having entered it, will remain if they can do so with a feeling that if they are faithful and strive to attain a degree of military proficiency, they will be rewarded, according to their deserts.

This method ought to insure the best men for officers, and it would be a good plan to adopt with reference to the non-commissioned officers as well; *mutatis mutandis*.

In the promotion of non-commissioned officers it might be well to take into account proficiency in drill and rifle practice, to be determined by competition.

This would have a direct tendency to encourage a knowledge of drill, and also to encourage rifle practice.

Nearly, if not quite, all officers are at some time non-commissioned officers, passing through this stage, they would become proficient in drill and with the rifle; and when about to become

officers the remaining essentials would be higher knowledge and faithfulness.

It may be urged that men will obey an officer whom they have elected more readily than they will obey any other person.

This is undoubtedly true as regards officers who are appointed, but when men feel that the person promoted fairly earned his promotion, they will respect his ability, and *one of the essentials of good discipline is that men should feel that those who command them are fitted to do so by superior knowledge.*

These are, of course, only the general outlines of a plan—the details would be varied, according to the ideas of those to whom its execution might be intrusted.

The central idea is to have all promotions regulated by competition, thus getting the best men for the offices.

Let me repeat that many young men feel that they cannot afford to spend time in a service where hope of promotion is one of the strongest incentives to that service, unless they can be certain that as they deserve so will they be rewarded.

## CERTAIN LAWS CONCERNING THE USE OF TROOPS IN CIVIL DISORDERS.

BY CAPTAIN PETER LEARY, JR., 4TH U. S. ARTILLERY.

**I**N anticipation of such civil disorder as may call for the use of military force nothing in the way of preparation should be omitted. Not the general preparation of men and arms but the deliberate and thoughtful formulation of such laws and means of warning to non-rioters, as will start the troops unembarrassed by doubts of their legal responsibilities on one hand, or fears, if innocent persons are killed, on the other.

The history of riots during the past twenty years shows the liability of collision between troops and mobs. While such collisions are in danger of aggravation from the growing complexity of the relations of labor to capital, there is also a phase to be considered, the result of the fact that in every instance of tumult there is a class engaged who are not honest strikers,—the turbulent element, having nothing to lose and everything to gain by riot, arson, and pillage. Mixed with these, however, there are always innocent men, women, and children, drawn by curiosity, ignorant of impending danger, giving perhaps the sympathy of their presence, but intending neither to take any active part in the operations of the mob, nor to knowingly run any personal risk in being on hand. When, during the Astor Place Riot in 1849 the 7th Regiment New York State Militia fired into the mob, many innocent persons were killed and wounded. It is established that many riots in which lives have been taken and valuable property destroyed, would have been quickly suppressed without serious loss, if all who were peaceably disposed and not active rioters in the beginning, had retired to and remained in their homes at the first official notification that public force would be employed.

Looking at the question from the point of view of promptly suppressing such outbreaks with the least danger to innocent persons, and indemnity to commanders for proper military action, it seems that we have reached a point at which humanity calls for a treatment of affairs, free from any jealousy of military power; for there is no possibility that the military power of the United States can ever be used by any man or any party for the



subversion of public liberty, or for any use foreign to the just objects of its maintenance.

It is conceded that no question as to the legality of the use of troops in such cases presents itself to a military commander. After a proclamation by the President of a state of insurrection in any part of the country, and after the use of troops is indicated pursuant to such a proclamation, it is a just presumption that such action is in strict obedience to the laws of the land. No responsibility is thrown on a military commander for any issue in law. His proper superiors have predetermined those questions for him. The only problem confronting him is the one of obeying his orders in the most conscientious and effective way. His military duty is the only one he is called on to do. But while this is obvious, it is equally obvious that the law of military interposition is not so phrased as to protect the officer after the event, from maliciously designed criminal process in local courts. Witness the case of Colonel A. B. Coit, 14th Regiment Ohio National Guard, who, after prosecution, has only been recently acquitted of the charge of manslaughter in a criminal court of his state. For upholding the dignity and honor of the laws of Ohio, and protecting the lives and property of her people, he has been subjected to humiliation and to great expense of money and time for which Ohio has refused to indemnify him.

#### THE RELATION OF MARTIAL LAW TO MOB VIOLENCE.

It is submitted that the legal principle known to us as martial law gives but little aid in treating the subject. It has been variously interpreted by the courts of the United States as 1.—“The law of military necessity in the actual presence of war administered by the General of the Army.” 2.—“It is the will of the general who commands the army. It supersedes all existing civil laws and is regulated by a well-known system or code of laws. The commander is the legislator, judge and executioner. There may or may not be a hearing upon the charges at his will. The law is resorted to only in cases of necessity, which is to be shown affirmatively by the commander who assumes to exercise it.” 3.—“In time of insurrection it cannot be applied to citizens in States in which the Courts are open, and their process unobstructed.” 4.—“For any abuse of the authority, the officer ordering, and the person committing the act may be liable as trespassers.”

Manifestly martial law furnishes no such direction as is needed to meet the conditions. On the contrary its tendency is to neutralize the value of military efficiency by imposing on commanders serious doubts as to the outcome of their official acts and as to their criminal liability before non-military tribunals.

The possibilities call for a system, carefully fixed by law and especially intended to meet the emergencies in the most humane but also in the most prompt and effective way.

Lieutenant Birkhimer expresses the following opinion in the preface to his valuable work "*Military Government and Martial Law.*" "When operating on foreign soil, the legal obligations of the dominant military are tested by one rule; when within their own territory by a wholly different rule, having regard to the civil and property rights of the inhabitants. What may be permissible to the commander in the exercise of his authority in the former, with no responsibility other than to his military superiors, might in the latter subject him to grave civil responsibilities. If it be attempted to throw around the officer in the latter case that immunity from civil liability which attaches to his conduct in the former, the people—his fellow citizens—might, with well-founded apprehensions, view the temporary establishment over them, for even the most laudable purpose, of the rule of military force. If, however, it be understood that this cannot be done; if the principle be established, that the commander who, under any circumstances whatsoever, assumes to enforce superior military power over the people and territory of his own country, does so under ultimate legal responsibility for his acts, military rule is deprived of its terrors, and the law-abiding citizen sees in it nothing except the firm application, for his benefit, of the powerful military hand, when civil institutions have ceased either wholly or at least effectively to perform their appropriate functions. Nor as to this does it signify whether temporary military supremacy results from efforts to repel invasion or to suppress insurrection. The rule of liability is the same in both cases."

The responsibility of the officer to civil and criminal process, during the prevalence of martial law in the actual state of war, being so established, it cannot well be doubted that his responsibility is equally established, when called out by superior authority to enforce the laws in case of strikes and outbreaks of mob violence.

It is a significant fact that of all the great powers of our time,

the United States and Great Britain, the most advanced in public liberty and in respect for law, have done the least, by way of legislative provision, for the prevention or the limitation, if not preventable, of mob violence.

In the territories of these powers the military arm is called into active use, superseding the civil power as a recognition of an actual state of war. In Germany and France special laws are in force for government under similar conditions known as the law of the State of Siege. Both countries are governed by laws passed under the sanction of and in conformity with their organic constitutions.

#### THE RIOT LAWS OF THE UNITED STATES AND GREAT BRITAIN.

The riot laws of the States composing the federal union are founded on the law known as the Riot Act, 1 George I., St. 2, ch. 5, which makes it the duty of the justice, sheriff, mayor, or other authority, whenever twelve persons or more are unlawfully, riotously and tumultuously assembled together, to the disturbance of the public peace, to resort to the place of such assembly and read the following proclamation: "Our sovereign lady the Queen chargeth and commandeth all persons being assembled immediately to disperse themselves and peaceably to depart to their habitations or to their lawful business upon the pains contained in the act made in the first year of King George for preventing tumultuous and riotous assemblages. God save the Queen."

It is a felony punishable with penal servitude for life to obstruct the reading of the proclamation or to remain or continue together unlawfully, riotously and tumultuously for one hour after the proclamation was made or for one hour after it would have been made but for being hindered.

The general principles of our riot laws are the same, but the penalties are lighter. The procedure of the authorities is practically the same in all the States, as are the conditions which justify the recourse to military force and the responsibilities of commanders of State troops.

The employment, however, of federal troops is prescribed in Article 52, U. S. Army regulations 1896.

Par. 488.—Officers of the army will not permit troops under their command to be used to aid the civil authorities as a posse comitatus, or in execution of the laws, except as provided in the foregoing paragraph (See A. R., 486-487).

Par. 489.—If time will permit, application for the use of troops for such purposes must be forwarded, with statements of all material facts, for the consideration and action of the President ; but in case of sudden and unexpected invasion, insurrection, or riot, endangering the public property of the United States, or in case of attempted or threatened robbery or interruption of the United States mails, or other equivalent emergency so imminent as to render it dangerous to await instructions requested through the speediest means of communication, an officer of the army may take such action before the receipt of instructions as the circumstances of the case and the law under which he is acting may justify, and will promptly report his action and the circumstances requiring it to the Adjutant General of the army by telegraph, if possible, for the information of the President.

Par. 490.—In the enforcement of the laws, troops are employed as a part of the military power of the United States, and act under the order of the President as Commander-in-chief. They cannot be directed to act under the orders of any civil officer. The commanding officers of troops so employed are directly responsible to their military superiors. Any unlawful or unauthorized act on their part would not be excusable on the ground of an order or request received by them from a marshal or any other civil officer.

Par. 491.—Troops called into action against a mob forcibly resisting or obstructing the execution of the laws of the United States, or attempting to destroy property belonging to or under the protection of the United States, are governed by the general regulations of the army and apply military tactics in respect to the manner in which they shall act to accomplish the desired end. It is purely a tactical question in what manner they shall use the weapons with which they are armed—whether by fire of musketry and artillery or by use of the bayonet and sabre, or by both, and at what stage of the operations each or either mode of attack shall be employed. This tactical question will be decided by the immediate commander of the troops, according to his judgment of the situation. The fire of troops should be withheld until timely warning has been given to the innocent who may be mingled with the mob. Troops must never fire into a crowd unless ordered by their commanding officer, except that single selected sharpshooters may shoot down individual rioters



who have fired upon or thrown missiles at their troops. As a general rule the bayonet alone should be used against mixed crowds in the first stages of a revolt. But as soon as sufficient warning has been given to enable the innocent to separate themselves from the guilty, the action of the troops should be governed solely by the tactical considerations involved in the duty they are ordered to perform. They should make their blows so effective as to promptly suppress all resistance to lawful authority, and should stop the destruction of life the moment lawless resistance has ceased. Punishment belongs not to the troops, but to the courts of justice."

#### THE RIOT LAWS OF THE GERMAN EMPIRE.

The following are the regulations of the German Empire for the use of troops in the state of siege.—

In Germany, a distinction exists between the state of siege in (a) "The Territory of the whole Empire," (b) the Kingdom of Prussia, (c) the "Reichsland," or the Territories of Alsace-Lorraine.

##### (a) *The Territory of the Whole Empire.*—

The declaration of the state of siege in this case is regulated by the provisions of article 68 of the Constitution of the Empire, as follows :

Art. 68.—The Emperor shall have the power, if public security within the Federal Territory demands it, to declare martial law (*Kriegszustand*)\* in any part of the Empire ; and until the publication of a law regulating the occasions, the form of announcement, and the effects of such a declaration, the provisions of the Prussian law of June 4, 1851, shall be considered in force.

The state of siege is thus defined in Colonel E. Hartmann's "*Militär-Hand-Wörterbuch für Armee und Marine*" :

The state of siege (*Belagerungszustand*) signifies the passing of every species of public authority to the military officials, to whom are thereby granted extraordinary powers. The state of siege may be declared in a city, a fortress, a district, etc. In the German Empire, (with the exception of Bavaria) the right belongs to the Emperor to declare the state of war to exist (*Kriegszustand*) in any part of the federal territory where the public safety is threatened. In case of war, every commander of a fortress situated in a province threatened by the enemy has the

\* Literally "State of War."

power to declare the state of siege to exist for his fortress and the territory depending thereon ; for other districts the right to make this declaration belongs to the commanding general (corps commander). The declaration of the state of siege is dependent upon the previous declaration of the state of war."

The provisions of the Prussian law of the 4th June, 1851, are given under the head of the Kingdom of Prussia.

(b) *The Kingdom of Prussia.*—

(The state of siege.—Law of the 4th of June, 1851.)

1. In case of war, and in those provinces threatened or already occupied by the enemy, any fortress and the territory depending thereon may, for the purpose of defense, be declared in a state of siege by the fortress commander, and any army corps district or portion thereof, may be so declared by the corps commander.

2. In case of riots also, when the danger to the public safety is urgent, the state of siege may be declared either in time of war or peace.

The declaration of the state of siege then issues from the Ministry of State ; it may, however, in urgent cases, with reference to particular places and districts, be issued provisionally by the highest military commander of the jurisdiction, on the application of the chief of the administration of the governmental district, and in case there is danger in delay, without such application. The declaration of the state of siege in such cases is, however, subject to the approval or the disapproval of the Ministry of State.

In fortresses, the provisional declaration of the state of siege issues from the fortress commander.

3. The declaration of the state of siege is to be announced by the beating of drums or the sounding of trumpets, and, in addition, the public are to be made generally acquainted therewith by means of communications to the town authorities, posters in public places, and also through the public press. The raising of the state of siege will be made a matter of general knowledge by means of announcements to the authorities of the towns and through the public press.

4. After the proclamation and declaration of the state of siege, the executive authority passes to the superior military commander. The authorities of the civil administration and of the towns are obliged to comply with the orders and demands of the superior military commander.

The superior military authorities in question are personally responsible for the orders that they issue.

5. If, on the declaration of the state of siege, it is deemed necessary to suspend articles 5, 6, 7, 27, 28, 29, 30 and 36 of the Constitution, or any of them, for the time and for the district, then it must be expressly so specified in the proclamation on the declaration of the state of siege, or else it must be announced in a special order, which is to be made known according to the proper forms (Par. 3).

The suspension of the above-mentioned articles, or any of them, is permissible for that district only which is declared in a state of siege, and only while the state of seige continues.

6. During the state of siege all military persons are subject to the laws which apply to a state of war. \* \* \*

7. In places or districts declared in a state of siege, the higher military jurisdiction over all military persons belonging to the garrison is in the hands of the commander of the garrison (in fortresses, the commandant).

To this officer belongs also the right to confirm all military judgments affecting such persons, excepting only condemnations to death in time of peace; these must be submitted for the approval of the commanding general of the province.

With reference to the lower jurisdiction the provisions of the military penal code remain in force.

(c) *The Reichsland, or Territories of Alsace-Lorraine.*—

(Preparation for the State of War in Alsace-Lorraine.—Law of the 30th May, 1892.)

Until a law on the state of war is passed which shall apply to the entire federal territory, the following regulations shall hold good for Alsace-Lorraine, and shall be in force from the day of their promulgation.

In the event of war, or in case danger of a hostile attack shall be imminent, every superior military commander holding a grade not lower than that of a field-officer, may provisionally assume the discharge of all executive powers for the purpose of the defense of the place or district under his command, until such time as the Emperor may decide whether the state of war shall be decreed, prompt report of the circumstances being made to him.

The assumption of executive powers is made by a proclamation by the superior military commander addressed to the civil administrative authorities of the place or district in question.

This proclamation is to be made known to the public in accordance with local custom.

The authorities of the civil administration and of the towns are obliged to comply with the orders and demands of the military commander. For their orders and demands the military commanders in question are personally responsible.

Concerning the orders issued, a report must be made to the Federal Council and to the Diet, either immediately or else at their next meeting.

Extracts from the "*Dienstvorschriften*" (Service regulations) for the Royal Prussian army, edition compiled by Colonel Karl v. Helldorff, Berlin, 1895.\*

(Relations of the military to the civil authorities when the military is ordered to the assistance of the latter.)

8. Whenever the military is ordered to the assistance of the civil authority, the military and its commander, not the civil authority, are to judge whether and in what manner arms shall be used. Whenever the civil authority requests the assistance of the military, the object and purpose for which assistance is sought must be stated so definitely as to enable the military to make suitable arrangements.

(Law of August 17, 1835, for the preservation of public order and of the respect due to law.—Extract.)

8. When a military force intervenes in a riot to disperse the mob and restore order, the officer or non-commissioned officer will order the mob to disperse, and enforce obedience by force of arms, if the mob fails to obey his order or his signal made by beating the drum or sounding the trumpet twice repeated.

9. If the military forces are forcibly resisted or attacked with arms or implements dangerous to life or limb, if stones or other objects are thrown at them, the armed forces, upon the order of their commander, are justified in firing on the mob.

10. The facts are established by an official report of the commander. In his report he has to give information on the following points :

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\* See p. 3. Art. 5 : Guarantee of personal liberty. Art. 6 : Inviolability of the domicile. Art. 7 : No one to be judged, except by the lawful tribunals. Art. 27 : Guarantee of freedom of speech and of the press. Art. 28 : Manner of punishing libels, etc. Art. 29 : Guarantee of right to assemble peaceably, etc. Art. 30 : Guarantee of right to form associations. Art. 36 : Limitations on right to employ the military for the suppression of civil disorders, etc.



The cause of his intervention, his orders to the mob, whether or not it was necessary to repeat them and the effect thereof whether forcible resistance was offered, in what it consisted, whether on the part of the rioters an attack was made with arms or other instruments, whether stones or other things were thrown, whether and what use he made of arms, particularly fire-arms, and in what manner he quelled the riot; lastly, whether any, and what damage was done to persons or things.

If more than one commander were engaged, the senior in rank renders the report, the reports of the others being enclosed in so far as they acted separately as regards time and place. The detailed account of the damage to persons and things is, if necessary, rendered by the police, and is furnished to the commander and forms part of his report.

Laws of March 28, 1872, for Alsace-Lorraine, concerning the use of arms by the military in peace.)

1. The military, acting in our service for the preservation of public order, quiet and safety, are authorized, when on guard and post, on patrol, transport, and all other details, even when the details are made upon request or for the assistance of the civil authority, to make use of their arms in the following cases enumerated in paragraphs 2-7.

2. If the troops which are ordered out on one of the above mentioned services are attacked, or are seriously threatened by an attack, or if they are resisted by force, or threats of violence, they will make use of their arms to repulse the attack and overpower the resistance.

3. Whenever the military ordered out on such services call upon the mob to lay down their arms or other instruments suitable for attack or defense, or otherwise dangerous, and such order is not immediately obeyed, or if the arms or other instruments, previously laid down, are resumed, the military will make use of its arms in order to enforce the obedience due it.

4. When an armed force intervenes in a riot to disperse the mob and restore order, the commander of the troops will order the mob to disperse, and compel the requisite obedience by force of arms, if the mob fails to obey his order or signal made by beating the drum or sounding the trumpet, twice repeated.

5. When a person is arrested and escapes or attempts to escape, the troops will use their arms to prevent such escape.

6. The troops are authorized to use their arms when prisoners

turned over to them for escort or safe keeping, seek to escape while *en route* to or from the prison.

7. Every sentry (inclusive of posts of honor) has, if necessary, to make use of his arms for the protection of the person or things he is to guard.

8. Troops may make use of their arms only so far as is necessary for the accomplishing the objects enumerated in pars. 2-7.

Fire-arms may only be used when either a special order is given therefor, or when the other arms seem insufficient to the end. The time when and the manner in which arms may be used, must in each case be decided by the military on the spot.

9. When the military is ordered to assist the civil authority, the military and its commander, not the civil authority, are to judge when and in what manner the arms should be resorted to. Whenever the civil authority requests the assistance of the military, the object and purpose for which assistance is sought must be stated so definitely as to enable the military to make suitable arrangements.

10. Whenever any one has been hurt by the use of arms on the part of the military, it becomes the duty of the latter, as soon as the circumstances permit, to inform the nearest police office; it then becomes the duty of the police to care for the wounded and cause the necessary judicial investigation.

11. It is presumed that in resorting to the use of arms, the military have acted within the limits of their authority, until the contrary is proven. The testimony of such persons as are guilty or suspected of participation in those acts which have caused the intervention of the military, does not constitute by itself proof of the abuse of arms by the military sufficient to subject the military to punishment.

*The Riot Laws of the French Republic.—*

(The law of France concerning the State of Siege, April 3, 1878, is as follows.)

Art. 1. "The state of siege may be declared in case of imminent peril only, resulting from a foreign war or an armed insurrection. The state of siege can only be declared by a special law and this law shall designate the towns, districts, or departments to which it applies. It also fixes the time the state of siege shall last. At the expiration of this time, the state of siege ceases legally, unless its operation is prolonged by a new law.

Art. 2. In case the Chambers are not in session, the President of the Republic may declare the state of siege, on the advice of the council of ministers, but the legal effect thereof is that the Chambers shall convene two days after the declaration.

Art. 3. In case of the dissolution of the Chamber of Deputies, and until the operations of a new election are completely fulfilled, the state of siege cannot be declared, even provisionally, by the President of the Republic. Nevertheless, in case of a foreign war, the President, on the advice of the council of ministers, may declare the state of siege in the territory threatened by the enemy, on condition of assembling the electoral colleges and of convoking the Chambers with as little delay as possible.

Art. 4. In case communications should be interrupted with Algeria, the governor may declare the whole or part of Algeria in a state of siege, conforming to the conditions of the present law.

Art. 5. In the cases provided for in Articles 2 and 3, the Chambers, as soon as they convene, maintain or raise the state of siege. In case of disagreement between the Chambers, the state of siege is legally raised.

Art. 6. Articles 4 and 5 of the Law of the 9th August, 1849, are continued in force, as well as the provisions of its other articles not contrary to the present law.

The Law of the 9th August, 1849, and the other laws and regulations, bearing on the subject of the employment of the military to suppress disorders, etc., will be found in the pamphlet, *Instructions en Cas de Troubles, Paris, 1895*.

The following are taken from those instructions :

3. No troops may be employed even in the town where they are established, except in pursuance of written requisition, made by the authorities which have the right, the prefect, under-prefect or other authorized civil officer.

4. Every action of the troops should be the result of a previous agreement between the military and the civil authority.

5. These requisitions should indicate clearly the end to be attained, while leaving at all times to the military commander the choice of the means for the attainment of the desired end.

6. In case of a flagrant crime or of urgency, he shall not wait for a written requisition. He shall immediately take measures which he judges necessary to disperse the mob or prevent aggression.

7. There is no exception to Rules 1 and 2 except in case of flagrant crime or great urgency when time and means for a reply are absolutely lacking.

9. It follows from the text of the laws upon the matter, that the civil functionary who is responsible for the maintenance of order (save in territory in the state of siege) shall take the direction of the police and shall remain sole judge of the proper time when the armed force may be called out.

10. But the military authority must not let itself be found unprepared for a requisition for troops. To this end, it must receive a first warning as soon as the public peace seems menaced and if the situation become graver the civil authorities shall again send information to the commander of the armed force, to prepare to intervene promptly, either by means of precaution or by manœuvres which shall paralyze the mob, so that the moment he acts on his own responsibility, his action shall be prompt and efficacious. Such is the object of the previous instructions formally prescribed in Article 16 of the Laws of July 10, 1791.

The commanders of troops, posts, guards, pickets, or patrols must not lose sight of the responsibilities relating to requisitions imposed on them by Article 19, Law of July 10, 1791, Article 41, Law of August 3, 1791, Article 64, rules for service in towns, and Article 234, ordinary penal code.

#### *Riots.—*

11. Riots in public roads or squares will not be tolerated and should be summoned to disperse.

#### *Public Proclamations.—*

12. Force or arms will never be employed by military commanders, except after the summons made as indicated in Articles 26 and 27, Law of August 3, 1791, and Article 169 of the Regulations for employment of troops in public places.

13. Nevertheless Article 25 of the same law prescribes that military commanders may use force of arms *without summons* in the three following cases :

1. If violence is used against the military forces, as where they are assailed by musketry or any kind of projectiles.

2. If they cannot otherwise defend the ground which they hold or the posts which they are guarding.

3. If they are expressly authorized in writing by the civil authority and only after the formalities prescribed in Articles 26 and 27, Law of August 3, 1791.



*Territories in the State of Siege.—*

14. The declaration of the state of siege, having for its immediate effect the transfer to the military authorities of all powers formerly exercised by the civil authorities, it follows that the military commander has no further need of the presence of a civil officer for making the public proclamation or summons. He may make it as of his own authority, and act entirely pursuant to the prescriptions in the law of 1791.

(Instructions for the employment of troops in case of insurrection.)

15. The programme and rôle of the army should be to maintain order under the laws and decisions of the sovereign authority of the country, while discouraging rigorously all political aspirations.

16. The army should lend assistance to the gendarmes and local police, and obey the legal requisitions for the maintenance of public security and order.

17. Every kind of boisterous crying out, of songs and of whistling or hissing will be rigorously prevented, and every disorderly assemblage dispersed. Every insult or public altercation between citizens and with greater reason every collision will be immediately dealt with.

18. Each commander of troops or detachments, should study in advance the safest measures to use in case of riot, in concert, if possible, with the civil authorities.

19. If, in a fortified place, or a garrisoned city, any trouble should suddenly occur, the officers, the sub-officers and the soldiers should immediately report to their respective quarters and remain there to wait for orders.

20. Officers who room in the neighborhood of barracks shall report there immediately; those who room at too great a distance, or in quarters where hostile assemblages might meet, shall remain in their quarters, and the adjutant of the regiment shall immediately send a sufficiently strong patrol, commanded by an officer, to go through the streets inhabited by officers who have not been able to report at quarters. These latter should hold themselves ready to join the patrol when in its passage opposite their lodgings.

21. The forces must not be divided up, but they shall be kept together, grouped so as to act with vigor. However, if the effective strength of the garrison permits it, the principal points from which the mob may be surrounded shall be occupied. In a large

city the places which command the principal avenues shall be occupied ; also the hotel of the prefecture and that of the general commanding, the prison, the hospital, the railroad depots, the office of the paymaster-general, etc. In a city in time of war the gates shall be seized and closed if necessary. In a small town the Hotel-de-Ville, the mayor's office or some other dominant points shall be seized.

22. It is of the greatest importance that the soldiers preserve their prestige and be neither insulted nor molested ; because if they should lose their moral force, order could no longer be preserved, except by violent measures. It is necessary then to avoid as far as possible any communication between the troops and agitators, and for the former to act with vigor when their intervention is indispensable. Absolute rules cannot be laid down in such a matter, but as soon as trouble is feared, then consign the troops to barracks and do not put them in movement until circumstances demand their intervention. Then their action, announced in advance as irresistible, should be prompt, resolute, and decisive. This is the best means to avoid collision, before which, however, they should not recoil, if it is necessary, because force should always remain with the law.

23. As soon as a riot takes place, or as soon as the third summons has been made without accomplishing any result, force should be employed without delay and without hesitation.

24. There should never be any question as to complying with requests made by mobs, to sheathe the bayonet, elevate pieces in air, hand over arms or evacuate a position. Any such transaction with rioters is either cowardice or treason.

25. Chiefs of detachments should themselves abstain from conversation with the public and should prevent the men from so doing, especially with the people who present themselves under the guise of conciliators.

26. It is especially necessary to hold the people off at such a distance, that they cannot harangue the soldiers or throw themselves suddenly on their arms. On arriving upon a boulevard, place, or street the commander of the troops should immediately make every one evacuate the ground he is to occupy and let no one come in.

27. Intercourse should cease immediately at the place seized by the troops. No one should be allowed to pass but the military or those furnished with proper authority.

28. The public shall be held at a distance of at least one hundred metres from the troops by the sentinels, who should not engage in any conversation with the crowd. They should not remain in one place and should repel every act of violence by force, and every attempt which might be made to snatch from them their weapons.

29. The chiefs of detachments shall declare in a loud and firm voice that the sentinels are forced and that this violence would be considered as an act of hostility which would be repelled by force of arms.

30. All these measures should be taken rapidly and without hesitation, for every minute's delay augments the moral and material strength of the mob.

*Combat With a Mob.—*

31. As far as possible avoid getting near a mob when they are behind barricades or under cover. Endeavor to turn the defenses of the mob by the unoccupied adjacent streets, or else go through the houses.

32. The detachments formed for this end should consist of regularly appointed component parts and should be accompanied by the engineer corps furnished with proper tools.

33. The doors of the houses may be easily forced by blows of a hatchet or with levers or crow-bars. If they are not barricaded a ball, shot into the lock, will be sufficient to open them.

34. More rapid work may be done with large petards or dynamite cartridges.

35. While some are endeavoring to force a house door, artillerymen, sheltered as far as possible in the embrasures of the doors, or ambuscaded in the windows of the neighboring houses, will keep strict watch over the barricades and the houses where the insurgents are, and will hold the windows in range so as to fire on all who present themselves.

36. In order to pass from one house to another break through the separating walls, which are generally not very thick, especially in the upper stories.

37. The strength of the detachments called out to be introduced into houses should not exceed 25 or 30 men, commanded by an officer. A greater number would produce confusion and disorder without aiding the work. Two or three men only can work at a time, and the rest should hold themselves ready to re-

pulse or to drive out the insurgents who are in the houses which are attacked.

38. If a barricade cannot be turned and the attack from the front fails, the commander should fight it at first with men placed in the windows of houses which are in front, then charge on the obstacle, with twenty-five or thirty men at the most, under an energetic officer.

39. They should be followed by two ranks of marksmen, marching rapidly on each side of the street, along the houses, to oppose the insurgents placed in the windows of the houses near the barricades. The rank on the right will fire on all who present themselves on the left, and the rank on the left on those who appear at the windows at the right.

40. Hold by preference to the right side of the street, because the defenders of the houses placed at the windows have more difficulty in firing with exactness on the assailants.

*Employment of Artillery.—*

41. The employment of artillery is nearly always advantageous. It exercises a puissant action on the courage and *morale* of the insurgents.

Shells or grape-shot are fired at the barricades or houses to demolish them, to open a breach, or to drive from them the defenders. Fire canister in the large avenues to disperse armed groups.

42. As in combat with the insurgents cannon cannot be employed except at short range, it is necessary, in order to keep the men and horses safe, to post the pieces under shelter, then to push them as rapidly as possible by hand to the position from which they can fire upon the barricade or the houses to be stormed.

43. Some one should come from the post with the planks, mattresses, etc., for the gunners.

44. If the resistance has been able to organize and to concentrate its means of action in a special quarter, this quarter should be completely surrounded by troops and closed in on from all sides at the same time, at a given signal, or at a moment agreed upon in advance.

45. If the mob dares at any time to take the offensive by charging, several discharges, either with cannon charged with canister, or of musketry upon the head of the column, will suffice to oblige them to retire. A charge with bayonets fixed will finish routing them.

46. The pursuit commenced, it is expedient to prolong it while closing in on the rioters, so as to prevent the possibility of their installing themselves behind the barricades or in the houses in their rear.

47. If, in any way, an isolated detachment finds itself to be too much pressed during an engagement with the mob it should establish itself in a house or on some other point more easy to guard and near that which it occupies, and should defend itself energetically, holding back the superior force, and should wait for succor, but under no pretext should it enter into parley with the insurgents.

*Employment of Cavalry.—*

48. Cavalry, whose rôle it is in the beginning, to maintain or facilitate communications, to oblige assemblies to disperse, and to act in streets and on boulevards, in which there are no material obstacles, either in riding directly on the insurgents, or especially in menancing their retreat, should, when the rioters retire, ride actively in pursuit, unless it is apprehended that they may divide to produce more effect.

49. Finally it is important not to lose sight of the fact that the action should not cease because the insurrection is apparently quelled. This is the moment to look again for the fractions of the mob, especially where they may hide, and to seize and disarm them; to search the houses in order to seize the arms and munitions; to proceed to the arrest of the ringleaders.

50. These perquisitions should not cease except when they have become entirely unprofitable.

*Movable Columns.—*

51. When there is reason to fear that troubles are going to occur in a place where there is no garrison, or that bands of rioters will run through the country to inspire terror, to burn or to pillage, mobile columns will be formed to reestablish order.

52. These mobile columns will be formed of infantry, cavalry, or artillery, or of these arms combined.

53. In every case they will be sufficiently strong to remove from the rioters every idea of resistance to the armed band, and also strong enough to immediately establish the public peace.

54. Should a commander not have enough of troops to send out sufficiently strong columns he will deal with mobs successively, but a column, in no case, should be exposed to failure, for



that would destroy the moral force of the troops, and would raise that of the mob.

55. It cannot be emphasized too strongly that when the armed force appears its action should be irresistible and decisive.

56. If the column is composed only of infantry it takes position around the locality in order to reconnoitre the point of attack, and if the obstacles are not too great, as soon as the arrangement of the defenses has been looked over, one or two small columns of twenty or thirty men each will charge, who will penetrate by the principal streets to the Hotel-de-Ville or to the town hall, which is generally the centre of resistance; they are followed by reinforcements who will guard their rear and who will take position, if necessary, in the houses. The rest of the column will then spread out towards the streets, will penetrate into the town and occupy the principal points, until the searches and arrests are finished.

57. The troops, during their stay, will be lodged by the inhabitants, but by groups—the officers in the midst of their men.

58. Discipline will be observed with the greatest rigor.

59. A general post will be established immediately. The town must be patrolled incessantly.

60. Cavalry alone is proper to pursue any bands who traverse the country pillaging and ravaging.

61. It may be employed ultimately to guard the gates of the town, to ride rapidly on a place where popular agitation begins, and to foil this attempt by its sudden arrival.

62. But, in order to enter alone into a town it is necessary for it to be numerous, and that part of the riders dismount, and fight as foot soldiers.

63. To infantry, as well as to cavalry, artillery lends an efficacious, material and moral support. For the most part the announcement of its approach suffices to dispel all idea of resistance.

64. In fine, if a mobile column is composed of the three arms it will be in a condition to break up every kind of resistance.

The cavalry will be in advance to observe the entrances of the insurgent town, to intimidate the defenders, by the promptitude of its arrival, and to arrest those people who are most compromised from escaping.

The infantry and artillery who will come later will overthrow all obstacles or barricades and will subjugate the mob.

65. Detachments of gendarmes, taken from the district and well acquainted with localities and persons, will march with the mobile columns to inform them, and to proceed with the arrests and with the verbal process.

66. If magistrates surrender in the insurgent districts, the columns will protect them and will furnish them all possible means to facilitate their mission, to proceed to arrests, and furnish escorts for prisoners.

*Instructions for the Formation of Mobile Columns.—*

67. Mobile columns, formed after the orders given, should be organized in advance, in such a way that the mobilizations may take place in a few hours, and the departure immediately afterwards.

68. The chiefs of column, especially if they are composed of troops of different arms, should in advance put themselves in communication with the commanders of separate parts and give them instructions in case of mobilization. They will assure themselves that the men are furnished with all that they should carry with them.

69. An officer should be selected from each column to perform the duties of *sous intendant*. He will take instructions about all that which concerns the administration and the subsistence of his column at the time it is mobilized. (The *sous intendant* is probably the same as quartermaster and commissary in the U. S. army.)

70. Another officer, designated to perform the duties of chief-of-staff, will take from the general commanding all dispatches, documents and instructions necessary for the accomplishment of the mission which has devolved upon the column.

71. The infantry should carry a full supply of cartridges. They will have in their haversacks, along with indispensable effects, only a day's ration in reserve, and a ration of sugar and of coffee.

72. They will carry the shelter tents, blankets and camp utensils.

73. The cavalry will have a day's feed of oats.

74. As far as possible, the troops will be quartered with the inhabitants, but by groups and not isolated, the officers being lodged with their companies.

75. The chiefs of detachments and of columns will make report, hierarchically, of their operations to their general of brigade, who will transmit these reports to the general of division, but, in

case of urgency, a report will be addressed by them directly to the general of division. These reports will contain an exposition of the operations executed, of the political state and especially of all that that concerns the installation and subsistence of the troops.

*Laws and Regulations.—*

(Extract from the Law of July 10, 1791.)

Art. 9. In every district the general commanding charged with enforcing the military regulations will, in general, be obliged to concert with the civil authorities, in order to procure the execution of all the measures or precautions which they have been able to take for the maintenance of the public peace, or for the observance of the laws, in such a manner as to obey their demands.

Art. 13. The commanders especially will conform, in their respective places, to what is prescribed in Art. 9 of the present law for the general commanding in the division.

Art. 16. In all circumstances which interest the police, order, the interior tranquility of places and where the participation of the troops may be judged necessary, the military commander will act only after a written request from the civil officers has been received, and, as far as he may do it, only after he has had a consultation with them.

Art. 17. In consequence, when he does act, either after temporary arrangement or after permanent precautions, such as regular patrols, detachments for the maintenance of order or the execution of the laws, police, of fairs, markets or of other public places, etc., the civil officers will send to the military commandant a requisition signed by themselves of which the divers objects shall be clearly explained or detailed, and in which they will designate the extent of the guard which they believe necessary, after which, the execution of the arrangements and all measures for enforcing them, such as sentinels' orders, placing of sentinels, bivouacs, conduct and direction of patrols, situation of guards and detachments, choice of troops and arms, and all other modes of execution shall be left to the direction of the military commandant, who will be responsible for them, as far as he has been notified by the civil officers that these precautions are necessary or that they should take another direction.

Art. 19. No troop shall change from the garrison in which it has been stationed except by an order to that effect from the

government, or, in urgent cases, from agents of the military authority to whom this power has been given.

(Extract from Law of August 3, 1791.)

Art. 20. No corps or detachment of troops of the line may act in the interior of the Kingdom without a legal requisition, under the penalties imposed by the laws.

Art. 22. Requisitions addressed to the commandants, either of troops of the line, national guards, or national gendarmerie will be written in the following form:

"We \_\_\_\_\_, require in virtue of the, law, N\_\_\_\_\_, commanding, etc., to lend the aid of troops of the line, or of the national gendarmerie, or of the national guard, necessary for \_\_\_\_\_ . For the guarantee of said commandants we here place our signature.

Sign. \_\_\_\_\_  
\_\_\_\_\_."

Art. 23. The execution of military arrangements will belong entirely to troops of the line. If he has to call out troops of the line from their stations "the determination of their number is left to the officer commanding on his own responsibility."

Art. 25. The depositary (trustee) of the public forces, either to assume the execution of the law, of judgment or orders, or mandate of justice or of police, or to break up popular mobs and seditious uprisings, and to seize the ringleaders or instigators of the mob or sedition, may only use force of arms in three cases.

First. If any violence or force is used against themselves.

Second. If they cannot otherwise defend the ground they hold or the posts of which they have charge.

Third. If they are expressly authorized by a civil officer, and in this third case, after the formalities prescribed by the two following articles:

Art. 26. If, on account of the progress of a mob, or popular uprising, or for any other cause, vigorous use of force becomes necessary, a civil officer, either a justice of the peace, or a municipal officer, procureur of the commune, or police commissioner, an administrator of district or of department, or a procureur syndic or procureur general syndic, will present himself at the place of the mob or uprising and will pronounce these words in a loud voice, "Obey the law. Force will be employed. Let all good citizens retire," while drummer beats a roll "to charge" at each summons.

Art. 27, Law of August 3, 1791. After this summons, three times repeated and even, in the case in which, after a first or a second summons, it will not be possible to make a second or third, if the persons in the mob do not retire peaceably, and even if there remain more than fifteen together, in a state of resistance, the force of arms will be instantly employed against the seditious without any responsibility for the consequences, and those who are seized will be handed over to the police officers, to be judged and punished according to the rigor of the law.

Art. 41. The chiefs of troops of the line, of the national gendarmerie, of guards of cities, or of the national guard, who refuse to execute the demands which are made on them will be pursued and punished by the penalties imposed by the Penal Code, without prejudice of the graver penalties pronounced by the law against crimes threatening the public peace.

(Extract from the Law of April 10, 1831.)

Art. 1. All persons who form riotous assemblies upon the public highways will be required to disperse at the first summons of prefects, under-prefects, mayors, mayors' assistants, or of all magistrates and civil officers charged with judgment of police, other than the *Gardes Champêtres* and *Gardes Forestiers*.

If the mob does not disperse the summons will be renewed three times; each one of these will be preceded by a roll of the drum, or a blast from a trumpet. If the three summons are useless, force will be employed in accordance to the Law of August 3, 1791.

(Extract from the Law on Riots, of June 7, 1848.)

Art. 1. Every armed riotous assembly formed on the public highway is forbidden. Equally every unarmed riotous assembly on the public highway is forbidden which might disturb the public peace.

Art. 2. The mob is armed, first, when several of the persons who compose it carry concealed or visible weapons; secondly, when a single one of the individuals carrying visible weapons is not immediately driven out from the mob by all who form part of it.

Art. 3. When an armed or unarmed mob is formed on the public highway, the mayor or one of his assistants, or in case of their absence the police commissioner or any agent or depositary of the public power, and of executive power, carrying the tri-



colored sash, will go to the place where the mob is. A roll of the drum will announce the arrival of the magistrate. If the mob is armed the magistrate will call on them to disperse and retire.

This first summons being without effect, a second summons, preceded by a roll of the drum, will be made by the magistrate.

In case of resistance the mob will be driven away by force. If the mob is unarmed the magistrate, after the first roll of the drum, will call upon the citizens to disperse. If they do not retire three summons will be made successively. In case of resistance the mob will be scattered by force. Extract from the ministerial letter of March 16, 1848, at Paris :

\* \* \* \* "You may delegate the powers which belong to you, of replying to summons, to those of the commandants, your subordinates, who, on account of their remoteness or isolation, have not easy communication with you, under the express condition of rendering to you an immediate report. You will use this power wisely in order to maintain the unity of the command. You will pay close attention to the maintenance of discipline and to the execution of the military regulations.

(Signed) "SUBERVIE."

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"PARIS, May 10, 1848.

"You must remember that you should obey demands only with troops at your disposal, and you must not regard those troops as dispensible, who are under orders from the Minister of War.

(Signed) "CHARRAS."

Finally on the 20th June, 1848, the Minister of War, General Cavaignac, reproduced the circular of March 16, and ordered rigorous observation of it to the letter.

(Law of August 9, 1849, on the state of siege.)

Art. 1. State of siege may only be declared in case of imminent peril, for external and interior security.

(About forms of declaration of state of siege.)

Art. 2. The National Assembly alone can declare the state of siege save in the exceptions here cited :

The declaration of the state of siege designates the corporations, parishes, or departments to which it applies and can be extended.

Art. 3. In the case of prorogation of the National Assembly

the President of the Republic may declare the state of siege on the advice of a council of his ministers.

(On the effects of the state of siege.)

Art. 7. As soon as the state of siege is declared the powers with which the civil authority has been vested for the maintenance of order and of the police, pass entirely over to the military authority. The civil authority nevertheless continues to exercise those of their powers of which the military authority has not dispossessed them.

Art. 8. The military tribunes can be seized for cognizance of crimes and offenses against the safety of the Republic, the Constitution, against order of public peace, whatever may be the station of the principal instigators and accomplices.

Art. 89. The military authority has the right :

1. Of search, by day or night, in the houses of citizens.
2. To remove prisoners in jail, and those individuals who have not their domicile in places covered by the state of siege.
3. To order the seizure of arms and munitions, and to proceed to seek for them.
4. To forbid publications and reunions which they judge from their nature will incite or encourage disorder.

(Raising of the state of siege.)

Art. 12. The National Assembly alone has the right to raise the state of siege when it has been declared or maintained by it.

Nevertheless, in case of prorogation this right will belong to the President of the Republic. The state of siege declared according to Art. 3, may be raised by the President of the Republic, in so much as it has not been maintained by the National Assembly.

Art. 13. After the raising of the state of siege the military tribunes will continue to recognize crimes and offenses, the prosecution of which has been begun by them.

(Regulation of March 1, 1854 on the service of the Gendarmerie.)

Art. 113. If the reports of the service indicate any popular mob or seditious uprising, the prefects, after having consulted with the general officer commanding the department, if he be present, and with the highest officer in rank of the gendarmerie in the residence at the chief manor house of the department, may require the union at the menaced point of the number of brigades necessary to establish order and peace. An account of the affair must be immediately rendered to the Minister of the In-

terior by the prefect, and to the Minister of War by the general officer or officer of the gendarmerie.

Art. 129. In all the previous cases by Articles 113, 114 of the present decree, if the maintenance or establishment of order cannot be assured, except by deploying a still larger force on the menaced point, the generals commanding the division and military subdivisions, independently of the employment of troops of the line, may order, upon the requisition of the prefects, the formation of detachments of gendarmerie, who will perform the duties of the service.

These detachments may be composed of men taken from the neighboring companies of the same military division. But, on account of the orders made by the Ministers of the Interior and of War, the general officers cannot assemble all the brigades of gendarmerie and move them from one department to another.

The prefects of the respective departments will prevent these movements.

Art. 136. If the officers of the gendarmerie recognize that an additional force is necessary in order to break up a seditious assembly, or to repress crimes, to transfer a considerable number of prisoners, to assure, in fine, the execution of the demands of the civil authority, they will immediately acquaint the prefects, or under-prefects with this, who will require either the commander of the department or the commandant of place to support the action of the gendarmerie by a sufficient number of troops of the line. The demands of the officers of the gendarmerie will contain the extract from the order or the requisition, and the motives for which assistance is demanded.

Art. 137. In urgent cases, the officers and under-officers of the gendarmerie may require directly the assistance of troops of the line, who are obliged to wait for their requisitions and lend immediate assistance. They will conform, for this service, to the second paragraph of the preceding article (136).

All military force in active service or on leave is obliged to lend aid to the agents of the public force, in conformity to Article 106 of the code of criminal instructions, and Art. 475 of the penal code (Circular of June 23, 1869).

Art. 138. When a detachment of troops of the line is employed jointly with the gendarmerie for a service, the command will belong, if grades are equal, to the officer of the last arm. If

the chief of detachment is of superior grade to the officer of the gendarmerie, he will take command.

But he is obliged to conform to the written requisitions made on him by the officer of the gendarmerie, who remains responsible for the execution of his commands, when the auxiliary officer has conformed to his requisition.

Art. 298. When a mob takes on a character and growth such that the gendarmerie, after energetic intervention, find themselves powerless to stop their resistance by force of arms, it will draw up a verbal process in which it points out the ringleaders and abettors of the sedition; it will immediately notify the local authority, also the commander of the company or of the parish, in order to obtain reinforcements from neighboring brigades and, following the case, from troops of the line or national guard.

(Regulations from the service of places, of October 4, 1891.)

Art. 64. The commanders of guards, of pickets, and patrols ought not to lose sight of the conditions of responsibility in regard to the maintenance of public order, which Article 234 of the penal code imposes on them, thus: Every commander, every officer or under-officer who, after having been legally required by civil authority, shall have refused to make the force under his orders act, shall be punished by an imprisonment of from one to three months, without prejudice, for the civil reparations which may be due. The civil authorities who have the right to make requisitions are prefects, under-prefects, mayors, mayors' assistants, procureur-generals of court of appeals, procureurs of the republic, near tribunes and their substitutes, the presidents of courts or of tribunals, judges of instruction, justices of peace, and police commissioners. In urgent cases officers and under-officers of gendarmerie may require directly the assistance of the troops, who are obliged to obey their requisitions and to lend them assistance.

Requisitions may be made in writing set forth in such a manner as to put in evidence their motive and object and must be signed by the proper authority.

But in obeying the requisitions of the functionary charged with the execution of the laws and regulations of the police, the chiefs of posts remain free to adopt such military arrangements properly expressed as the object of the requisition appears to them to demand. The present article is in force in all corps of the guard.



Art. 65. If a chief of post is informed that disorders of a serious nature, caused by the military, or of which the military are the victims, have arisen in a wine house, a café, or any other public place, there will be sent on an under-officer or a corporal with the number of men necessary to arrest, if there is need, the disturbers or to protect the military who are threatened.

If these disorders take place in a house, the chief of post will send there a detachment. But he cannot enter without a requisition from the occupant, or without the assistance of a police commissioner.

Art. 71. In case of alarm the chiefs of post will hold their troops under arms. They will never allow a mob or assembly to form in the vicinity of a detachment of the guard. If these mobs persist, the chiefs will see if the symptoms are serious, they will cause the sentries to be alert, they will determine the circumstances in which they should fall back on the post, and make the troops charge in case of imminent peril. The commander of the forces, the police commissioner, and the neighboring posts are immediately warned, if communications permit it. In case of attack the commander of the guard will defend his post energetically by all the means in his power and to the last extremity, while conforming for this defense to the orders that the commander of the troops has given for each post, in view of an outcome of this kind. These dispositions are made known, in conformity to Article 18, to the posts which ought to fall back on the others, and the posts which should be defended to the uttermost. In case of attack, the guards, patrols and pickets may not make use of their arms except in the circumstances and under the conditions foreseen by Article 169.

Art. 167. When the intervention of the troops is judged necessary to maintain the public order and to assure the execution of the laws, the military authority will act upon requisition, written by competent authority (see Art. 64) and, as far as possible, after having consulted with it. The motives and objects of the requisition should be clearly expressed.

The choice and the execution of the measures to take belong exclusively to the military authority whose responsibility in this matter is complete.

\* \* \* \* \*

Art. 169. In case of troubles outside of the circumstances specified by Art. 62, in which troops that are the object of an at-



tack should defend themselves by all possible means, they can make use of arms for the establishment of order only in the condition hereafter determined by the Law of June 7, 1848. When a mob is formed upon the public way, the mayor or assistant, or, in their absence, the police commissioner or other agent of the public force wearing the tricolored sash, goes to the place of the mob. A roll of the drum announces the arrival of the magistrate. If the mob is armed, the magistrate summons them to disperse and retire. If this first summons remains without effect, a second summons preceded by a roll of the drum or of a sound of a trumpet, is made by the magistrate. In case of resistance the mob is driven away by force. If the mob is unarmed the magistrate, after the first roll of the drum, exhorts the citizens to disperse. If they do not retire three summons are made in succession. If the mob resists it is driven away by force.

#### CONCLUSIONS.

The following conclusions are drawn from this survey of the regulations governing the employment of troops in civil disorders.

It is evident that one policy governs in Great Britain and the United States and another in Germany and France; one leaving the handling of mobs to the municipal police force, which, under stress, yields its authority to military force when the mob is in full swing and possession; the other assuming control under most carefully prepared laws, either in anticipation of danger or in its presence, is fully instructed to meet any condition of tumult. The people of France and Germany, having made the laws, know perfectly their scope and operation in every particular.

Quoting again from the introduction to Birkhimer's "Military Government and Martial Law," he asks: "Which of these two distinct policies is wiser; whether to permit martial law to spring forth the creature of accident, as generally has been the case in Great Britain and the United States, or whether it be the part of wisdom to accept the occasional happening of that imperious necessity, which alone justifies resort to martial law as an established fact, based on experience, and provide for its regulation by law is for the legislature to decide."

Enlightened statesmanship would seem to call for specific measures to meet the inevitable dangers of the future. The interests of humanity and economy, of capital and labor, of civic order and law call for wise provision by the National and State

legislatures to meet a condition of affairs liable to happen at any time in any part of our immense territory.

WHAT SHOULD BE THE PROVISIONS OF SUCH LEGISLATION?

First. A legal recognition and designation of a state of public danger, analogous to the state of siege in peace, as in Germany and France.

Second. A prescribed and definite system of public notification by proclamation of the condition of public danger.

Third. A prescribed and definite system of warning to rioters by the public press; by drum or trumpet or flag signals, or all three, which shall be peculiar to the condition of public danger and as well known to the public as the flag signals of the Weather Bureau. Such flags should be displayed from designated public buildings and in the hands of the troops in movement against mobs.

Fourth. Specific instructions to troops for such direction as may be ordinarily required under the conditions of tumult.

Fifth. Legal authority to close places where intoxicating liquor may be procured and to suspend business in whole or in part, as the crisis may require.

Sixth. Full responsibility to be imposed on all commanders for the propriety of their action.

Seventh. Such responsibility shall be to the military authority exclusively.

Eighth. No officer or soldier to be held answerable to any civil tribunal for any act done in the execution of his instructions or by way of duty, but shall be held primarily responsible to his military superiors and triable only by a legal military court.

Ninth. Absolute indemnity against criminal indictment or pecuniary damages for any act found by the Commander-in-chief of the troops engaged, either on the part of the United States or of the separate States, to have been justified by an existing condition of public danger.

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NOTE.—The writer desires to express his obligation to the Military Information Division of the Adjutant-General's Office for the part of this paper relating to the State of Siege in Germany and France and to Mr. Theodore M. Leary for the translation of the "*Instructions en Cas de Troubles*, Paris, 1895."

# Reprints and Translations.

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## NOTES ON AUSTRIAN FIELD ARTILLERY.

BY LIEUT.-COLONEL DE C. DANIELL, R. A.

(*From Proceedings Royal Artillery Institution.*)

**B**EING at Görz last summer I was able, thanks to the courtesy of the Commandant of the Artillery, to visit the barracks. I found the officers most willing to show me over every part, and to afford me any information I wanted.

The artillery of the garrison consists of three field batteries, under a lieut.-colonel. In peace time only four guns and a small number of wagons are horsed per battery—the number of horses in each being 44. The remaining guns and all the ammunition are stored in the citadel, whilst the spare carriages are kept in a large gun-shed. These are stacked in two tiers, the upper one resting on planks laid along the wheels of the lower, thus greatly economizing space. In the story above is kept the spare harness, amounting to several hundred sets, each hung on one peg, except the collars which are stocked according to sizes. On mobilization the horses would be paraded below in batches, the harness thrown out of the large loft door, and the fitting would be carried out in a very short time.

The stables, one per battery, are long, well-ventilated buildings with a height at centre of arched roof of 18 feet. The windows with outside wooden shutters to exclude heat and glare. Down the centre is a passage 9 feet wide, slightly raised in the middle with a shallow drain on each side. The stalls are 10 feet long by 5½ wide, containing only a corn manger—the hay being placed on the ground; a far better plan than putting it up in racks. Both bails and posts are well protected by straw bands for about 3 feet.

The bedding is first formed by selecting trusses of strong straw 5 feet long—these are laid flush with the side drains, tightly packed down to a thickness of about a foot, and secured by a light batten across. On this permanent part, and on the stall beyond, some loose straw is scattered at night and removed in the morning. The permanent bedding is allowed to remain 3 or 4 months, except in cases of any horse contracting an infectious disease. When I visited the stables the bedding had only been laid for a few days—the stables smelt particularly sweet and were scrupulously clean, and I was told that even after it had been down for months there was no offensive smell. A great deal is due to the care taken—an orderly being told off night and day to catch the urine in a small bucket on the end of a 4-foot handle whenever the horses staled.

I have seen troop stables in America where the horses were stabled on

wood floors, slightly sloped to the rear, without litter of any sort with most satisfactory results as far as cleanliness.

The daily ration consists of—

Oats.....	3½	kilos.=	7¾	lbs.
Straw.....	1½	"	=	3¼ "
Hay, wheelers.....	4½	"	=	10 " nearly.
" other horses...	3½	"	=	7¾ "

In winter the wheelers, and any other horses which carry heavy coats, are clipped and blanketted up.

The harness struck one as being particularly light and simple, at the same time very serviceable.

The traces of flat leather, 1½ inches wide with some 3 feet of twisted rope at the far end, are secured in front to a large staple on the hames by a triangular D, one side of which consists of a movable pin secured by a tie. To the rope end, in the case of leaders, is attached a rope trace, which passes through a suspending loop on the centre horse's fittings, fastens to one of the pole swingle-trees—thus each horse has a direct pull on the carriage. The traces of the centre horses are similarly attached. The wither strap of the off horse is fastened to a leather strap 1½ inches wide, which rests along the horse's back, sufficiently far to support the traces and hip straps—there being no crupper. Belly-bands are of leather. The harness of the wheelers is similar, except that there is in addition a light breeching, which is attached on each side to the trace, about half way up, and suspended from the back strap.

The pole strap is attached to a broad leather strap, which goes across the front of the collars, fastened at either end to the same D as the traces.

The pole is about 15 feet long—the method of coupling throughout consists of a ring on one part and a pin on a chain on the other, the pin being put through the ring from above.

The riding horses have a bit rein and the off horses a bridoon leading rein and side rein. The stirrups have flat bars. A folded blanket is carried under the saddle, which is roomy and well padded, with a flap about 3 inches projecting round the soft seat. The cloak and mess-tin are carried in rear, and in front are 2 saddle-bags containing change of linen, stable head-collar and cleaning traps. The leather is blackened, also the hames—the remainder of the iron work, of which there is little, being kept bright.

The guns are of bronze, 9 centimetres (slightly over 3.5 inches). Three gunners ride on the limber, two on the axletree seats. The axletree and limber seats are well padded and have a broad supporting strap—that on the limber is a foot from the rear, along which runs a net some 18 inches high, between it and the strap the men's great-coats are stowed, their kits being carried on the wagon. There is a tire brake worked by a wheel in front. The handspike is always carried shipped; the pin-tail being on a semicircular iron band projecting two feet behind the limber on which the back flap rests when laid down. The shells are carried on wooden boxes which pull out. On the foot-board is a box for spare traces and similar stores.

Thirty-four rounds are carried per gun and 94 per wagon.



The gun and limber packed (with five men) weighs 1910 kilos. (39¼ cwt.), the wagon (with three) 2202 kilos. (45 cwt.), six horses to guns and wagons and a mounted N.-C.O. to each two guns.

The barrack-rooms are airy and very clean and tidy. The bedsteads consist of light iron frames and wood-bottom boards—good thick pal-liasses and white sheets and blankets.

Both gunners and drivers wear breeches and boots, the latter being very well made and light.

The mounted N.-C.O.'s have cavalry swords and revolvers, all others a short straight sword—a few rifles are carried for escort or guard duty.

The officers wear dark-brown cord breeches, black boots, a plain blue tunic not unlike our own—the only ornamentation being red cuffs, a red patch on either side of the collar on which are the badges of rank, viz.: one, two or three small gold stars, a thin gold shoulder cord on the left side only, gold laced belts and slings and a peaked cap laced according to rank. The general effect is very neat and smart, and far more inexpensive than with us—a tunic only costing £3!

The horses, as a rule, were lower and lighter than our own, but showed little signs of the hard work they had lately done, for the batteries had just returned from two months' manœuvres over a very rough country during the hottest time in the year, still there were no signs of galls of any sort; this is probably due to a certain extent to the excellent system of harnessing which, by-the-by, has been selected by the Shah of Persia as a pattern for his own—that it is very light and still most durable there seems to be no doubt, and it is naturally well fitted for hot climates.

The men were sturdy and well built and seemed cheerful and willing—drawn as they are from various districts, often speaking only their own dialects (six or seven in a battery), the officers have to do a great deal through the better educated N.-C.O.'s.

Service in the artillery is very popular and both officers and men are proud of the arm to which they belong.

The officers are good riders and good whips—both of which accomplishments they acquire under most favorable conditions on first joining, as horses, hounds and brakes are kept up for this purpose by government at the school of instruction for the mounted branches.

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## SWORD AND PISTOL \*

(From the *United Service Gazette*.)

BY COLONEL M. J. KING-HARMAN.

**T**HAT distinguished officer, the late General Sir George Chesney, once gave this piece of advice to the students at Cooper's Hill College, that each one of them on joining the service should adopt some hobby apart from his profession as a relaxation, and a very valuable piece of advice it is too.

In order to be an efficient combatant, it is necessary that an officer

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\* Abridged from the article in the *Journal* of the United Service Institution of India.



should be a complete master of the weapons with which he is armed. Examinations in various subjects which appear to be increasing in number steadily are considered to be necessary for the production of good officers, but as yet no examination in swordsmanship or pistol shooting has been considered necessary. The reason for this I cannot guess, but I am in great hopes that in course of time one will be instituted for all young officers before they are gazetted as lieutenants in any branch of the service. We insist on a certain standard of excellence in the use of arms being attained by all private soldiers, but we attach no importance to the fighting capabilities of the officers who have to lead those soldiers. There seems to me to be something unreasonable in that. Every weapon with which an officer or a soldier is armed should be the very best of its kind that can be produced.

Starting from those two as my base, I will now endeavor to place before the readers of this journal the results of my experiences during the past three years, and the conclusions that I have drawn from them. The sword being in my opinion the most important of the two weapons, I will commence with it. If I was asked my reasons for that preference I should feel inclined to answer, in the words of that famous old Irish song,

"The pistol flashed,  
His head I smashed;  
Och! Shillelagh never missed fire."

Any pistol may happen to misfire, and if that occurs when your adversary is five yards off you will be in an awkward position, unless you have a trusty sword in your right hand, and know how to use it.

Few people have any idea of the number of different patterns of swords that have been introduced into the service at various times, and we shall not gain much by going into that question at any length now; but, as illustrating the ideas that have prevailed, it may interest some of you to know that prior to November, 1888, there were in the service five separate patterns for dismounted staff sergeants. It must be remembered that the infantry staff sergeant's sword was similar in construction to the swords worn by officers; but it was not the only weapon which government supplied to those men: they were also armed with a pistol each, and so had the advantage over the officers, who up to 1888 were not, I think, obliged to have pistols as part of their equipment.

Possibly there are many who have never heard how it came about that those five patterns were reduced to one pattern blade and two patterns of hilts—one gilt and one steel—and I did not know the full particulars myself until within the last three years. It happened in this way. When the old 65th York and Lancaster Regiment returned to England from the Soudan, the officer who had to report on the arms reported the swords of the staff sergeants to be useless as weapons of offense and of very little use for defensive purposes, and added in all seriousness some remarkable words, to the effect that, as the staff sergeants were armed with pistols, possibly the uselessness of their swords was not of much consequence. It was probable that the stinging, though unintended sarcasm contained in the last remark brought matters to a head, as it was not long before the pattern was changed, and a better class of sword was issued. That is to

say, it was in less than five years. It must be remembered that at that time there was considerable, but only temporary popular indignation over the extremely inconvenient revelations concerning twisted bayonets and broken cavalry swords in the Soudan and Egypt.

The years 1887-89 were busy ones for all interested in swords, for during those years, in addition to the staff sergeants' swords, very important changes were made in the cutlasses and sword-bayonet cutlasses issued to the Royal Navy; and attempts were also made to provide a really good sword for the Household Cavalry. It was during the discussion which took place regarding the latter that one of the high responsible officials made great efforts to settle the important question whether the sword should be a cutting or a thrusting one. He demonstrated clearly that they were two absolutely different weapons, and that conditions of balance, weight, handle, and quality of material rendered it impossible for a sword to be made equally good for both purposes. It is a great pity that our national love for compromises leads us to ignore that most important point. It may appear strange, but it is nevertheless true, that those are identical opinions held and expressed by professional sword-makers. They say that if government will once decide which description of sword is to be used, they will find no difficulty in obtaining the best possible article from the trade in England; but that none of them will insure the success of a hybrid.

Strange to say, during all that time no notice was taken of the infantry officer's sword. Most of the discussions and experiments turned on the bending tests of the blades; and the result was curious. The sealed pattern staff sergeant's sword resisted a vertical pressure of 33 lbs. before deviating from a straight line. The new naval cutlass resisted not less than 70 lbs.; and the Household Cavalry sword (pattern 1888) resisted 28 lbs. No reason was given, or can be given for such differences. But what I want to know is why a sword which is required to be thrust through the body of a heavily clothed man should be pliable. If it bends it will not go through; and if it does not penetrate the force of impact is too small to cause injury to the body thrust at. We do not make our lances or bayonets pliable; there certainly is an official bending test for the triangular bayonet, but it is resistance to a weight of 440 lbs., which almost amounts to rigidity.

An extremely interesting and valuable report on the best tests to be applied to and the best material to be used in making swords was submitted to the War Office by Sir F. Bramwell and Mr. B. Baker in August, 1889, but it is too long and too full of technicalities to reproduce here. My own opinion is that we shall never arrive at finality in this matter until we adopt a rigid blade; the proper shape of the blade will very soon be found directly the question of cut or thrust is decided, and the length and shape of handle, which is of equal if not greater importance, will follow on that.

The more rigid a blade is, the more effective must it be for thrusting; and rigidity does not in any way detract from cutting power—witness the old Damascus scimitars or a good Indian tulwar. Colonel G. M. Fox, a noted swordsman and inspector of gymnasia in Great Britain is strongly in favor of a straight pointing sword; and he makes no secret of his con-

viction that the present cavalry sword is far too heavy even for our Heavy Dragoons. The sword controls the man instead of the man controlling the sword. Any of you can prove that yourselves by half an hour's actual trial, and it was also clearly demonstrated by the colonel of a famous cavalry regiment in his lecture at the Royal United Service Institution on "Cavalry Equipment." This opinion was arrived at long ago by those eminently practical gentlemen Messrs. Latham and Musgrave, of the Wilkinson Sword Company, who exhibit in their show-room a sword of their own design and make which, I think, embodies Colonel Fox's views, but which is of a peculiar form and very light, which they strongly recommend for cavalry. It is strong enough to resist any number of blows or to parry a bayonet thrust; it is rigid enough to be thrust through anything; and it has no edge, therefore there is no inducement for a man to attempt to cut or beat with it. Such a sword only requires to be held straight and thrust forward with as much force as possible; therefore our officers and men could be easily taught the use of it, and a charge by a regiment so armed would possibly prove more effective than a charge of Lancers. I believe that no one doubts the superiority of the point of western nations over the eastern cut.

At one time I advocated the use of either a purely cutting sword or a purely thrusting one, but I am now convinced that the former would never answer in the hands of English troopers; if, however, the latter form was adopted, what would become of our beautiful but perfectly useless sword exercise and pursuing practice? As illustrating the utter inability of the average trooper to use the edge of his regulation sword, I may mention a curious incident that occurred at the Regent's Park barracks in the year 1885, and which only came to my notice at a comparatively recent date, when six trained mounted men of the Life Guards were had out before a special committee to show how deeply they could cut with sharpened regulation swords into the body of a dead horse, but none of them could cut with the edge leading, and all of them hit with more or less of the flat side of the sword.

There are some distinguished men who are still in favor of having an edge to pointing swords, and their argument is that in a close *mêlée*, where opposing forces are mixed up closely together, the men may be so jammed up as to be unable to use the point effectively and that the cut will then be of the greatest use. I have never been in such a position myself, but my idea is that if a man is so tight wedged in by others as to be unable to drive his point with one motion into something—man or horse in front of him or to one side—he certainly will be equally unable to raise his hand sufficiently to deliver a blow which requires two separate movements, and which also requires a certain amount of space in order to make the blow tell; and further, I am sure that the chances are all against that blow being with the true edge. With a short, curved weapon in the hands of an expert it might be just possible, but not otherwise. I attach no importance to the argument that if a man thrusts his sword into a body he will have great difficulty in drawing it out again, and that, meanwhile, he will be defenseless; that may be or it may not be, and, anyhow, the man has done for

somebody. But I do attach importance to the fact that an uplifted arm means an undefended body, and that a blow with the side of a sword generally means a broken weapon.

The new sword for infantry officers which was introduced about three years ago is an improvement on its predecessors, but it is still a compromise. It was intended to be chiefly a thrusting sword, but it is not sufficiently rigid to be accepted as such, and the handle is neither long enough nor properly shaped for that purpose; added to which the blade is edged for the purpose of being used for cutting, but it is too narrow and light to carry through an effective cut, therefore it is neither one thing nor the other, although probably intended to be both. With a properly shaped handle it would make a good duelling sword, but it is not an efficient fighting-weapon for active service.

It will be welcome news to many to hear that, at last, the pretty gilt guard has been officially condemned, and a steel one has been sanctioned instead; but no other change appears to be contemplated just at present, which is a great pity, the more so because the sword cutlers themselves are very open in pointing out the defects and in demonstrating how they can be remedied; and, moreover, the requisite changes will entail no expense on government because the officers pay for their own swords.

I hope some day to see the large elaborate guard done away with, because it cramps the free action of the hand and wrist, and is most inconvenient when the sword is worn in a service belt, or even when it is hooked up in peace time. I own that it looks very well, and I know that for that reason alone few would like to give it up, but a plain cross-hilt would look nearly as well, and would be far more comfortable. As for being a defense for the hand, well, I think that is only an excuse for a bad swordsman; but for a man who can use his sword ever so little, I am sure that his best defense lies in his blade, and you may be sure that if a man can cut your hand, he can with equal ease cut your head, which will answer his purpose much better. I will not waste time and space in attempting to describe the number of different kinds of swords that I examined when at home last winter, but if anyone has a taste in that direction, I should advise him to pay a visit to the armory in the Tower of London, which contains an incomplete though a fairly good collection of duelling and fighting swords; and a careful examination of them will surely set any man thinking how or why it is that we as a nation appear to be so ignorant about swords.

Having given so much space to the sword, I must now pass on to the use of it. I should like to know how many officers in India have learnt the use of the sword practically during the past three years. There cannot be many, and I fear that there are very few. There appear to be two reasons for that; one is the lamentable want of instructors, and the other is the want of inclination on the part of the officers. This may raise a smile, but it is a fact. At how many stations in India or elsewhere are there voluntary fencing classes, and how many officers attend those classes? The lack of instructors can only be got over by sending men home to be trained; but meanwhile a great deal more can easily be learnt from the few who are in this country than is now done; and very much can be accomplished by self-



instruction. I know of one distinguished regiment, the officers of which took the matter into their own hands a few years ago, and deliberately taught themselves fencing and also revolver shooting, so it is plain that where there is a will there is always a way. Of course, if men are individually so apathetic that they will not voluntarily learn the use of their weapons, the only other way of teaching them is by compulsion; and I hope that even that unpopular course will be adopted rather than that the mass of our officers should be left much longer in such ignorance as they are at present. Every officer should take a pride in his knowledge of his own weapons, and such knowledge will give him complete self-confidence wherever he goes.

I am well aware what the duties of an officer are towards his men, both in peace and in war, so I need not be reminded of them; and I am very far from being an advocate of an officer neglecting those duties in an endeavor to secure fame through a series of independent personal encounters; yet that is one of the sins that is laid at my door. I am also thoroughly sick of the oft-repeated but groundless statement that nowadays officers have so much to do as not to have time to devote to a short practise occasionally in fencing or shooting. It would of course be a disgrace to our army if such were true, but fortunately it is not so. We have already in the regular and auxiliary forces of the empire some of the finest swordsmen in the world, and there appears no sufficient reason why every officer should not be an expert swordsman.

I notice that those who object most strongly to officers being combatants belong entirely to the party that contains in its ranks many who will doubtless soon be urging the necessity for having a final and searching examination for general officers previous to death, they themselves being, as usual, alone excepted. Be it known unto them that expertness in swordsmanship is not incompatible with a complete knowledge of tactics, and that in all probability the best tactician will prove to be the ablest swordsman.

It may seem strange that in order to get really good instructors it will be necessary to send men home to be trained; but so it is, and I had it from the chief inspector himself that he has not one single available man whom he could send out to this country; but so keen is he about the training of our officers and men that he will be only too glad to receive and to give special instruction to any number of selected non-commissioned officers or men who may be sent to him from India for that purpose. In his opinion, such men should undergo one year's continued instruction in order to make them thoroughly efficient. It is fortunate for the army that we have such a competent enthusiast at the head of the gymnastic establishment; but so far the infection of his enthusiasm has not caught on to many others, which is much to be regretted.

Independently of the acknowledged fact that a combatant officer ought to be able to fight, it appears incomprehensible that officers do not study, for the sake of recreation and exercise, the beautiful art of fencing, which is the most thorough and complete, as it is also the most intellectual of all physical exercise. It seems unfair, though, to throw all or even much of



the blame on our young officers, because they have these good excuses—namely, that they were not taught fencing or indeed any kind of fighting when they were at school; that the instruction given them on joining the army, which has heretofore been very seldom given at all, was of too perfunctory a nature and of too short duration to do them any good, or even to excite their interest in the matter at all; and that no encouragement whatever has been given to them since. I think that you will all agree that those are very valid reasons.

I may also tell you that the small amount of instruction which is imparted at Sandhurst is almost useless; and so I have now come to the conclusion, which has also been arrived at by others, that the original sinners in respect to this apparent apathy amongst our junior officers are their parents and their schoolmasters. I was confirmed in that opinion by reading a most interesting paper contributed to the *Journal* of the Royal United Service Institution in September last year, by that well-known author and accomplished swordsman, Captain A. Hutton, and by a visit which I paid in his company to Bradfield College, Berkshire, last December, where I witnessed a most interesting and highly creditable display of modern fencing, old sword play and gymnastics, under the direct personal supervision of the head-master and two of the assistant-masters, in which a large number of the boys of all ages took part, in the school gymnasium. The proficiency and enthusiasm exhibited by all, especially those engaged in the final bouts, was a complete revelation to me. No other school studies or games were neglected for the gymnasium; and the physique, appearance, and good behavior of all the boys was quite remarkable. There is very strict discipline at the school. My only regret was that so few of them appeared to be destined to be soldiers. What has been so successfully achieved at Bradfield can be just as easily and as well done at all other schools; and I earnestly hope that other principals will lose no time in following the good example set them in teaching our embryo officers the use of their weapons and in enforcing stricter discipline than generally exists at present.

Fencing is an art which should be commenced young, and it will be found so attractive and alluring that in the future as in the past it will never be forgotten and seldom dropped. At the same time there is nothing so difficult about it that it cannot be taken up and worked with success by men of almost any age. It is, unfortunately, the fashion amongst many people to say that a knowledge of swordsmanship is no longer of any use because the days of hand-to-hand fighting have long since passed away. But even if that were true as regards European warfare, of which I am not so certain, yet proficiency in the use of arms can never be considered as derogatory to the position of an English officer; and, situated as we are with the constant liability to be engaged in fights with warlike tribes in Asia, Africa, and elsewhere, where hand-to-hand fighting with born swordsmen will ever be, as it has been hitherto, the rule, it is absolutely essential that each one of our combatant officers should be a competent master of his weapons; and, moreover, no one can deny that in the past many a fine British officer could and would have saved his own life as well as the lives

of others, and so continue to lead on his men to victory, if he had only been armed with good weapons and had known how to use them.

Through the kindness of Colonel Russell, commanding the Inns of Court Rifle Volunteers, I was permitted to visit the fine gymnasium belonging to that corps, and saw some very fine fencing with foils and with sabres by several of the members. In that school they have the advantage of the services of Sergeant-Major Blackburne, late of the Life Guards, who is supposed to be one of the best instructors in London; and the keenest interest is taken by all ranks in fencing generally. I was unfortunately unable to avail myself of many kind invitations to visit the school of the London Rifle Brigade, which corps possesses a large number of well-known fencers, including those belonging to the Cadet company from King's College School, who ably assisted at the fine exhibition of swordsmanship which was given at Toynbee Hall after the lecture by Lieut. Stenson-Cooke, last January. But the most important gymnasium in London is that belonging to the London Fencing Club at No. 7 Cleveland Row, St. James', to which I had the honor of being admitted as a visiting member. This club consists of some 300 members, and is under the direction of a committee with Mr. W. E. Hartopp as secretary. There are two French *mâtres d'armes* as fencing instructors, and a special gymnastic instructor, and nothing is wanting to make the club the most convenient place of the sort that can be seen anywhere. The election is by ballot, with an annual subscription and a small entrance donation. Some of the best men in London, including Captain Alfred Hutton, may be seen fencing there any afternoon, and a great many officers of the Household Cavalry and Brigade of Guards are active members of the club.

The place that attracted me most of all was the magnificent central gymnasium at Aldershot; and, thanks to the courtesy of the presiding genius, Colonel G. M. Fox, I was able to pay two long and most interesting visits to that centre of gymnastic and fencing instruction for the British army. I can imagine nothing more perfect than the system of instruction for non-commissioned officers and soldiers which is carried on there; but the time allowed for the instruction of the recruit officers is not half long enough. The material to be worked on is not always very promising; in fact, I saw young officers there who could not possibly have been properly turned out under six months, and then they would have still required a further term of six months before they could have passed muster as fencers. However, that is not the fault of the inspector, who would gladly work them into shape if he was given time; but it is the fault of the original bringing up and school life—I cannot call it training—of those young gentlemen who enter the service of her Majesty with the object of leading her troops in battle, and yet who in too many instances are utterly unable to take care of themselves. I say that a very serious responsibility rests with parents and masters who are bringing up our boys in such needless luxury as they enjoy nowadays and in sending them out into the world inferior in physique sometimes to their own sisters, unused to discipline, and unable to undergo hard work and exposure without falling sick.

I consider that the custom which has been adopted at most of our schools of giving each boy a room to himself is most harmful in every way;

boys are molly-coddled nowadays to such an extent that many of them have no chance of growing up into hardy, independent, vigorous men. I should like to see the whole of the interior economy of our boys' schools altered back to what it used to be even twenty years ago ; we should not then have to complain that the women were bigger than the men, as they often are now, or to mourn the death of so many young men from the dreaded so-called typhoid fever. I only hope that before long this may be taken up as a national question and thoroughly worked out ; it may then be found that want of stamina has more to say to typhoid than milk or water or anything else.

To quote the words of one of the best writers on physical training—" A Natural Method of Physical Training," by Edwin Checkley : " The trouble is, that so many of our latter-day health codes are framed by men who mistake the exigencies of their own decrepitude for the normal condition of mankind." Often our boys are not allowed to go out of doors in cold weather without a warm comforter of some sort round their necks, and a great coat on their backs ; consequently the first time they are exposed to any unusual hardship, down they go. Our girls, with their scanty clothing, when young, and their totally different school treatment, grow up much hardier, and more enduring than the boys. That used not to be the case thirty or even twenty years ago, and it ought not to be allowed to continue any longer.

My chief object in visiting Aldershot was to thoroughly understand the new system of fencing which is being now taught there and which has attracted considerable attention throughout England. It is known generally as the Italian system, but in reality it is not the Italian system, but a radical departure from it, and is, to be accurate, the Florentine system, which was originally invented by Radielli in the middle of the present century, and was brought to its final stage of perfection by that great master, Masiello of Florence, whose wonderful performances at the Grand Military Tournament may have been witnessed by some of you.

To make a long story short, Colonel Fox decided from personal experience that this Florentine system was the best in existence, and, acting on his advice, it has been officially adopted for the British army ; but no orders have been issued that all officers are to qualify in it. Whether or not it is the best system for adoption I am not prepared to say ; but this I can say, that it differs in all essential respects from the French system, which is adopted everywhere out of Italy, and that it has been rejected by all the clubs and schools in London that I know of. It does not follow from this that the system is faulty, because we are a conservative people in many ways and do not take readily to new ways ; but the fact is that during the past five or six years there has been a great and general revival of fencing in London, which is gradually extending to the counties, and many medical men have now recognized the extreme value of that form of exercise, and are ordering it for their patients amongst overworked professional men and hypochondriacs. People are very much in earnest about fencing, the schools are full of pupils, and there are constant open competitions at the German club, at Chiosso's and other gymnasiums, which has produced a friendly rivalry amongst the instructors, who, of course, try in every legitimate way to turn out winners from amongst their pupils, and to outdo each other ;

and thus it has happened that this Florentine system appears to have received full and impartial trial by all, and to have been rejected as being in no way superior to the French system, and as being not considered quite suitable for Englishmen.

Further, owing to the enormously increased exertion and strain on the whole body which is indispensable to the attainment of anything approaching proficiency in the new system, the doctors have been examining it from a medical point of view, and from what I have heard I think it probable that they will pronounce against it, especially for boys. Anyone wishing to study the new system should do so at Aldershot, where he will see it worked to perfection by that grand swordsman and athlete, Sergeant-Major Palmer, and his two chief assistants.

The new book of instruction in the use of the sword, which deals most exhaustively with the subject, does not touch on the use of the foil, from which it will naturally be inferred that the foil is to be discontinued as a weapon of instruction in our army, and that, if true, will possibly arouse the opposition of the nation. A careful study of the book and its excellent illustrations will, perhaps convey to some, as it does to me, the impression that this system is one of aggressive force in attack, combined with great power of defense, against the edge, but that it lacks entirely the graceful vigor, the refinement and suppleness of the art as practised in France and elsewhere. I may observe that the instruction sword referred to in the book differs in many important respects from the regulation sword, and that many movements which are possible with the one are almost impossible with the other.

It is highly desirable that we should have one established system for all England, and now is the time to take advantage of the enthusiasm which prevails to settle definitely which it should be. It is distinctly undesirable that two separate and opposite systems should prevail. Colonel Fox is the great champion of the Florentine system and Captain Hutton is one of the most experienced exponents of the French; both of them have done wonders in encouraging the study of swordsmanship in England; and I believe that between them a way could easily be found to settle this important question. But who will take the first step? That is where the difficulty lies. I hope, however, that some one in authority will step in and take the matter up and have it definitely settled in the most public manner possible, either at or before the next tournament. Both sides are quite confident of being able to prove their respective cases, and both know how desirable it is to have the matter settled one way or the other. A healthy rivalry is a good thing, but acrimonious letter-writing in the public press is unseemly and leads to no good. The following illustrations will show you the difference between the two systems so far as regards the position of the fencer when "on guard" and when on the "lunge." Three great points of difference will be at once observed—namely, the width of base, the position of the right arm, and the attitude of the body.

In the French system, the distance between the feet when "on guard" is laid down as twice the length of the foot as near as may be, but in the Florentine system it is two and a half foot lengths; and it is this extra



compulsory distance which is found to cause a great strain on the muscles in the region of the pelvis so much condemned by doctors. Instructions in the French system insist on the body being kept well braced up and the head erect when extended on the lunge, in order that a proper balance may be maintained and the recovery to the position of guard be facilitated; whilst the Florentine instructions contend that those two important points—*i. e.*, correct balance and quick recovery—as well as extended reach, are gained by starting from a wide base and throwing the body and head as much forward as possible. Both cannot be right, and the right way only should be adopted, whichever it is.

Again, the French work with a supple wrist and fingers, commencing from a bent arm and a free, unconstrained position of body, the hand and eye working together under the guidance of the brain; whereas the exponents of the Florentine school work with a tight, claw-like grip and a stiff wrist, commencing from a rigid straight arm, the chief work of parry and thrust being done by the elbow and shoulder, on the principle that those parts being nearer the brain than the wrist, their action must, therefore, be quicker and more correct than that performed by wrist and finger action. They may be right in this point also, but if they are, all I can say is that they should be called on to prove it by actual trial before their views are accepted; and I hope that before long some means will be found of proving clearly, not only which system is right, but also which is most suitable for us.

After reading so far, the first question that I will naturally be asked by most people is this, What is thought of this new system in Italy, the land of its birth? Well, all I can say is that I made careful inquiries on that point when I was in Italy lately, and I found that the system now being adopted by us at home is considered inferior to that of the Roman school, and is not adopted, I believe, in the Italian army or navy. The Roman system differs very slightly from that of France, and it must be remembered that in Italy, as in other continental countries, the army and navy represent the nation, whereas in England they certainly do not. Signor Parizi was sent over to one of our grand military tournaments in London as an exponent of the Italian system of fencing.

I will now pass on to revolvers. Three years ago the present regulation revolver was ready for issue, but the ammunition for it was not ready. Since then the ammunition has been supplied and the revolver has had a very fair trial. The pistol is undoubtedly a great improvement on the obsolete Enfield revolver, but it is still far behind many others that are obtainable in the market, and cannot compare in any way with either the Colt .45, or with the Smith and Wesson of the Russian army, .44 calibre. However, both the pistol and the ammunition were made according to government specifications, therefore no blame attaches to the makers. Had Messrs. Webley & Co. or any other good professional pistol-maker in England been given *carte blanche* and told to produce the most accurate and strongest man-killing revolver in the world, they would probably have been able to do so. But they were not told that, and we know the result.

The Wilkinson Sword Company are now at work on a revolver which,



from what I have seen of it, promises to be a formidable rival to all the best existing patterns; but, even if they are successful, we shall still want a reliable man-killing cartridge, with a propelling charge which will drop any man within a range of 25 or 30 yards. That same enterprising firm has just opened an underground revolver range at No. 19 Swallow Street, Piccadilly, where for a trifling cost any one can try any revolver that he likes before purchasing it. It is the only place of the kind that I know of in London. I tried two revolvers there myself, using cartridges filled with the new S. V. smokeless powder, which are sold by Eley Bros. For accurate match shooting, there is probably nothing that comes up to Colt's new single-action revolver which has just come out.

Until quite recently, the prevailing opinion regarding the manner in which the revolver should be used on service was that it should be employed first, commencing at about 25 yards distance, and that the sword should be kept ready in the right hand for use at close quarters; but with the present regulation short-barrelled weapon it is now considered by many good authorities that the revolver should be retained in the left hand, loaded and ready to support the sword in case of failure to make good the first thrust, or in case of having to encounter two or more antagonists at the same time. There are no doubt many who have known or heard of instances in which officers have missed six shots in succession at men coming at them, and then having failed to make good their thrust or cut, or having broken their sword, have been quite at the mercy of any assailant until some one came to their assistance. Of course in a fight the chief requisite is a cool head, and if that is backed up by good weapons, and a good knowledge of their use, the result, humanly speaking, can never be in doubt.

During the past three years great attention has been paid to the use of the revolver, and a most extraordinary improvement in revolver shooting has taken place; but we still want a reliable man-killing weapon that will not jam or stick in continuous firing, and I hope that we shall soon get one. The weightiest evidence against the present pattern of army revolver lies in the fact that few officers will purchase one when they can get any other.

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## THE INTERIOR ECONOMY OF THE ARMIES OF NAPOLEON.

BY MAJOR E. S. MAY, R. A.

(From the *United Service Magazine*, London)

PUBLIC attention has recently been much directed to all questions affecting the well-being and efficiency of the soldier. The spread of the volunteer movement has made many civilians learned in military questions, and every second man you meet has his own ideas as regards discipline and administration, and is prepared to bring forward arguments in support of his views. The recent letters on "Army Reform" form a striking example of how many think on such subjects, and how various are the conclusions they arrive at. *Tot homines, quot sententia.* It

is not now proposed to wander into this maze of controversy ; it is enough for us to point out that the mere fact of its having been kept so prominently before the public argues a strong and general desire to probe the sources of military efficiency, and go to the root of the causes that make a fighting machine formidable. Everyone admits that more than a mere question of pay or tactics is involved. Courage in the men and intelligence amongst the officers can be legislated for by no act of parliament, nor will the most judiciously-composed manual insure their presence.

Human nature is in every age the same, and has at all times shown itself highly susceptible to influences outside mere professional requirements, and capable of vast and unexpected efforts in response to an opportune appeal to its moral instincts. Such influences must be invoked, and the call must be genially responded to if the utmost is to be got out of the soldier, and, therefore, to utilize some such motive force has ever been the study and aim of great leaders of men. Sometimes a mysterious personal magnetism has been sufficient. The glamour of Napoleon's name was equal to 40,000 men on the field of battle, according to the estimate of his greatest opponent, while readers of Sir John Kincaid will remember the confidence that rival inspired on his side too, and how "his long nose was worth 10,000 men to us any day in the fight." Oftener, perhaps, religious feeling or fanaticism has underlain and given a basis to military discipline and success. We have lately been told by Lord Wolseley that Cromwell's army was perhaps the most efficient one of modern times, and no doubt it does supply a singular example of how self-respect and a stern sense of duty will turn the scale where race and courage and physique are on both sides equal. The bravery and self-sacrifice displayed in all ages by the followers of the prophet is likewise the direct outcome of religious fervor, though of a lower type. Here the appeal is to baser instincts, and offers sensual in place of spiritual rewards ; yet it has ever acquired an influence over its followers which a purer faith has striven for in vain, because its promises are more readily understood and appreciated by the natures to which it is addressed. Similarly, motives lower still in human nature can sometimes be made to incite to brave and chivalrous deeds of arms.

Patriotism walks hand-in-hand with religion, and frequently but reiterates her call ; yet the lust of conquest, avarice, vanity, the spirit of the gambler, sordid incentives, as they sound, have often nerved men to splendid efforts and magnificent success. A clever piece of timely flattery or the jingle of prize-money will rouse some minds that would be deaf to other calls. Nevertheless, the baser passions, if they can more easily be excited, may readily become a source of weakness rather than of strength, and are at best but an uncertain element to reckon with.

Napoleon well understood human nature, and perhaps succeeded to a greater degree than any other leader in gaining the confidence and affection of those he led. His system exhibits, however, the defects as well as the advantages which must ever accrue to one resting on no secure moral basis, and for this reason is especially interesting. A German pamphlet has lately drawn attention to what life in his army was like, and from it much of the information in the following pages has been drawn.

The French army of his day might be entered in a variety of ways. As a volunteer, as a conscript, as a volunteer for the Imperial Guard, or as a student from the military school of Fontainebleau. The first two methods demanded only certain physical qualifications, which, however, in the case of conscripts, especially in the latter days of the empire, were not very strictly insisted on. Volunteers for the Guard, on the other hand, in addition to physical fitness, had to show that they were possessed of a private income of 300 francs ere they might enter the cavalry, and of 200 francs before they could join the infantry of that distinguished corps. They had also to display some educational proficiency, and might hope to become commissioned officers in about four years.

There was considerable competition thus to enter the Guard, not only to escape the conscription, but also because there existed a genuine military enthusiasm amongst the youth of France at that time, and usually no difficulty was experienced in getting volunteers.

The military school of Fontainebleau formed the chief nursery for young officers for the army, and could accommodate as many as 600 cadets, who received their commissions when about eighteen years of age. It is said that the Emperor was very careful what officers were selected for duty at this establishment, and would only appoint such as were particularly well qualified and suitable. The course of study there embraced instruction in history, geography, mathematics, fortification, topography, and freehand drawing, and four hours were devoted to drill every day. Discipline was severe and exacting, even the reading of novels was forbidden, and cadets were recommended to study the drill regulations in their spare moments, if indeed they found they had any. The food was simple but sufficient, and good of its kind, and was issued under much the same regulations as were observed in the soldiers' barrack-rooms. The cost of maintaining a boy there was about 1200 francs a year, which was then looked upon as a heavy sum, but which did not deter the young men of France from eagerly coming forward as candidates. Such magic was there in a showy uniform, the brightness of the victories in the wars that followed the Revolution, the prestige of Napoleon's name, and the alluring visions conjured up by his tempting phrase about the bâton that might be stowed away in the knapsack of the meanest soldier. It is to those words that the motives which animated the French soldiers of those times may chiefly be attributed. The spirit of the gambler was abroad. The old order had been changed and was gone for ever with the old ideas and the old watchwords. Their leader no longer appealed to their love of country, no longer rallied them to defend their hearths and homes, but called them to wars of aggrandizement and annexation where booty and plunder might be looked for. His own career and that of his generals through the stormy scenes of the Revolution was the best example of what might be in store for a man with intellect and energy, and with such striking instances ever before them, every officer, non-commissioned, and private in that army, could hope that some day the fortune of war might bring him to the top, and allow him to reach similar heights of wealth or greatness.

Sensuality and luxury were by no means strangers to those either high

or low in rank. Marshals and generals, it is to be feared, set but a bad example to their subordinates. They grew rich at the expense of the inhabitants of the lands they occupied, and were paid often heavy sums for issuing orders against plundering (which, by the way, were usually disregarded), or for exempting towns from requisitions or occupation. They kept open house, were surrounded by a large retinue, which included captains, subalterns, footmen, grooms, etc.; and their servants were dressed in uniforms similar to those of their aide-de-camps, with the exception that they had no epaulets. So soon do we find aristocratic ceremony superseding republican simplicity! In the lower ranks, as was to be expected, the same tendency towards waste and extravagance displayed itself. Pay was often insufficient, and sometimes not forthcoming. The commissariat arrangements were frequently defective, and men had to live as best they could from hand to mouth. "The war was to support the war," as Napoleon said, or, in other words, men must shift for themselves. When one considers the effect of the example set them by their superiors, and that plundering was winked at, if not authorized, one need hardly feel surprise that the men tried to compensate themselves for previous hunger and privations, by making the most of any opportunities that occurred, and that the population of the country they passed through suffered accordingly.

The soldiers of Napoleon's army were so well looked after as regards pay and comforts that there was usually little cause on these grounds for excesses. We find that under ordinary circumstances the pay of the private was 52 centimes a day, which, making allowance for the lower value of money in our time, may be looked on as something like what a shilling a day is now. His men, therefore, were as well paid as is our volunteer army of the present day, and they also received a free bread ration and a supply of firewood. Twelve centimes were deducted from a man's daily pay to go towards the cost of his dinner, and we learn that the cast-iron system of allowing the same quantity of food to all alike, however differently constituted they might physically be, was not in vogue as it is with us, but that exceptionally large and powerful men received a double ration.

A recruit on joining was allowed a sum of 40 francs, which was to provide him with shoes, kneebreeches, gaiters, and shirts. He had to keep up these articles himself afterwards, and a sum of 10 centimes a day was deducted from his pay for this purpose. He was obliged always to be in possession of three pairs of serviceable shoes, and three shirts, and yet it is said that those who were careful of their kits could save something from what the authorized daily deduction just referred to left them, and that such savings were placed to their credit by the company to which they belonged.

The dress of the French army of eighty or ninety years ago did not prevent its accomplishing great feats of marching, and gaining brilliant victories, and yet must be pronounced to have been even less calculated for the soldier's comfort on service than the clothes men are to-day expected to fight in. Breeches buckled at the knee, stockings, shoes and gaiters, clothed his lower limbs. Each man carried a knapsack, musket, an ammunition pouch, and fifty rounds, a loaf of bread, a piece of meat, and either a camp-kettle or an axe, and was therefore not over-burdened, even



if somewhat heavily laden. Discipline must consequently have been indifferent, for we read that the first bivouac was usually enough to get rid of whatever of these articles could best be spared. The arrangements made for feeding the troops in the field were almost always quite inadequate, and many irregularities were the natural consequence of a system which opened the door to dishonesty and abuses of all kinds. Magazines of stores were not as a rule provided beforehand, but the chance resources of the country which formed the theatre of war were chiefly relied on. It is stated that often twenty times what was required might be brought into camp, and what was not used would be left behind and lost when the troops moved on. The regiments which subsequently arrived on the spot found nothing left for them, and devastated the neighborhood in their search for the means of subsistence. Cellars were broken into frequently, a cask of wine broached by the ready method of firing a bullet into its side, and when the men had drunk their fill, what was not immediately needed was allowed to flow away, and comrades overtaken in drink are said to have been left more than once to drown in such wasteful deluges. Sometimes, where plenty succeeded periods of privation, the troops in place of going to sleep after their day's march would sit up the greater part of the night cooking and feasting round their camp fires, and full hospitals were the consequences of such excess and disregard of dietetic rules. Cooks were eagerly sought after amongst recruits, and were welcomed before all others to the ranks of a company. The company cook did not go into action, but remained behind to provide for the evening meal, while each captain had a sort of freebooting retainer in his service, who foraged for his master. If in exceptional cases rations were supplied from magazines the officers and men alike received a sufficient supply of bread, meat, salt, rice, etc., which, eked out as it was by extras obtained from villagers or sutlers, enabled them to live very comfortably. A natural outcome of the system which prevailed was that the restaurants in Paris sent agents with supplies to follow the army, and catered for those who could afford to deal with them. Chevet, of Paris, especially was able to provide the good living and luxuries of the capital for his customers, but his prices were so enormous that only officers of the highest rank and highly paid officials attached to the forces could patronize him. When a district had been occupied for some time, and the inhabitants began to feel the pangs of hunger themselves, they took to hiding their corn and other food supplies in holes in the ground, or in the woods, that it might thus escape the rapacity of the invaders. The task of feeding the army was then a very difficult one, and often proved insurmountable in spite of the large numbers of commissariat officials who were with the troops. These gentry took but little trouble for anyone but the Guard. The ordinary linesman got often little but potatoes, while the horses had to do with straw alone. But care was taken that the Guard enjoyed plenty, and had enough to last four days, and then the Emperor was assured that the army was well provided for and contented.

These commissaries were extremely unpopular with the men, and justly so apparently. They seem to have cared little for the comfort of those



they had to look after, kept the best quarters for themselves, and amassed money in all sorts of irregular ways. They were corrupt in making contracts, lent money to officers, and adulterated the wine which was sometimes issued to the troops, as, for example, when the contents of the cellars of the Abbey of M $\ddot{o}$ lk, and the monasteries of Neuberg and Raygern, were placed at the disposal of the soldiers for several months. On the eve of the battle of Wagram it is recorded that several commissaries were detected in the act of selling the rations intended for the Guard, and were shot a few hours later by Napoleon's orders, who determined on this occasion at any rate to make an example of them.

It is, nevertheless, difficult to understand how a leader with so keen an eye to details, and who must well have understood how detrimental to the army so irregular a system could not fail to become, allowed it to continue, and did not use his vast powers of organization to deal with the matter.

One direct outcome of such a state of things was marauding, which was carried out, under the guise of looking for supplies, in a most deliberate fashion. Nothing like a genuine and sustained effort was ever made to put a stop to it, except on the rare occasions when the army happened to be well found in supplies, and there was consequently less excuse than usual for the practice, but usually swarms of marauders hung on the flanks of the army, and sometimes it was even found necessary to detach a small column to turn them out of a village, of which they had taken possession, and refused to quit. When a man had been three days absent from the ranks he was declared a deserter; but the marauders took good care to return before the expiration of the third day, and thus escaped the consequences they would incur by a longer absence. The example set by the senior officers tended to encourage crime of this kind. When the soldiers saw, as they did especially in Spain, beautiful paintings, and the spoils of the churches and convents ruthlessly seized and sent on their way to Paris, they were naturally encouraged in their own lawlessness, and such conduct bore fruit not only in a general demoralization, but in the hatred and ill-feeling it aroused in the breasts of the unfortunate inhabitants of the plundered country. Priests denounced the invaders from the altar, and revenge became sanctified by religion.

Thousands of French soldiers were cut off and hanged by the infuriated Spaniards during those years, and at length their generals found themselves compelled to resort to the most extreme measures for the punishment of trivial offenses. Thus at one time when dysentery, caused by the troops gorging themselves with grapes, was decimating the ranks, and the vineyards were put out of bounds, several men who crossed the forbidden limits and entered them were shot for the offense. The state of our own army in the Peninsula has frequently been animadverted on, and Wellington has been blamed for the bad discipline which prevailed; but it is questionable whether the conduct of our adversaries was not even worse. Duelling, the child of insubordination, was rife in every rank, and was a recognized institution in the army. At one time in Spain all the officers of one regiment were actually pledged to fight all those of another, and it was

only because Marshal Suchet ordered one of the regiments to march elsewhere in the nick of time that this combat *en masse* was averted. Not the least potent cause of this inordinate love of duelling was the system which brought about sudden and startling promotion, not beyond suspicion of favoritism. Men's minds, from bugler to marshal, were in a continual state of ferment as to promotion, and heads were turned by the brilliant examples of good fortune in this respect which were daily before them. "The cool shade of aristocracy" did not chill the ardor of the French recruit. Privates from the ranks had risen to be generals, and marshals and dukes, while Bernadotte had climbed to the throne itself. The spirit of gambling took the place of a sense of duty, and selfishness was the ruling principle of life.

By degrees the mushroom nobility which grew up round the Emperor became as grasping and unprincipled as the old. The sons of marshals, dukes, and courtiers were pushed forward with unusual rapidity. In the latter days of the empire, when many of the marshals and generals of France had become enriched by foreign spoils or the generosity of their master, and possessed luxurious mansions in Paris, or handsome country seats in its neighborhood, they began to care more for their comfort and the enjoyment of their gains, than for the excitement of a campaign. They felt more inclined to rest on their laurels than to acquire more, and so, to retain their services and stimulate their energies, the Emperor had to play on their greed of gain in another direction, and made the promotion of their sons and relations the price of renewed activity. The *Journal des Sciences* has recently published some information about the history of the marshals of France, which fully explains Napoleon's complaint that he "had made his marshals too rich." In addition to the privileges and precedence appertaining to the office and the yearly salary of 40,000 francs, we learn that he gave them large donations and emoluments in addition. Berthier, for example, received 10,000 francs a month as chief of the staff, and got no less than 1,255,000 francs besides in various ways every year. Davoust had 900,000 francs additional each year. Ney 730,000, Masséna 680,000. The others all got considerable sums also, although nothing like as much as those we have specified. Thus Lannes received 325,000 francs, Soult 300,000, Mortier 200,000, Marmont 120,000, and Macdonald 80,000. Altogether it is calculated that his marshals cost the Emperor the enormous sum of more than six and a half million francs annually. No wonder, then, as they grew old and gray, they felt inclined rather to enjoy what they had already gained than to add to their fortunes or dignities.

And in course of time aristocratic customs began to reappear amongst them. They held levees and received visitors with much of the old pomp and ceremony, and were styled "Your Excellency" and "Monseigneur." When the introduction of one's name in one of their despatches meant promotion, and the commencement, perhaps of a brilliant career, we may be sure they were duly fawned upon and flattered by their subordinates, and had their circle of courtiers like their predecessors of the *haute noblesse*.

The composition of the Guard and the favor shown to it had also an un-

favorable effect on the rest of the army. It always marched on the principal roads, and its comfort was first attended to by the commissariat department, the other troops only getting what it did not require. The best educated and finest men were drafted from the line to fill its ranks, and every man selected must have served for four years, and been through two campaigns. Thus it formed a veritable *corps d'élite*, but at the expense of general efficiency. Their comrades of the line nicknamed them the "Immortals," because they were seldom brought into action, but were held in hand by the Emperor till the crisis of the day, when they were put in with telling effect. They always wore their full dress in the field. Each rank in the Guard corresponded to the grade next above it in the line. Everybody naturally strove to become a Guardsman. The consequence naturally ensued that men were no longer content to serve from a sense of duty in the stations they were called to, but were ever restless, dissatisfied, and on the lookout for some chance of pushing their fortunes. The good and evil of such a system are here well exemplified; the tendency to insubordination and growth of selfishness, but at the same time the brilliant deeds of bravery and patient endurance to which it could goad some natures. The common soldiers took an immense interest in the way operations were conducted, and each had his own opinion on the subject. They cheerfully submitted to such privations as were inevitable, and eagerly volunteered for any dangerous enterprise, yet murmured if exposed to unnecessary hardships, and sharply criticised the orders of their superiors. They would freely follow a good general, but had an ill-concealed contempt for incapacity in high places.

Napoleon, whose successes were largely due to the rapidity of his movements, nevertheless adopted a method of marching which does not appear worthy of our imitation. According to his system the troops were on the road the entire day, even under ordinary circumstances. The men, therefore, did not get settled into their bivouacs till late in the evening, and in place of going to sleep sat up half the night cooking and eating. It was frequently found necessary, therefore, to halt for a day's rest, and no more was in the end accomplished than might have been done had the distances to be covered on each day been less.

Usually marches were conducted in this wise. A non-commissioned officer marched at the head of the columns and set a short regular pace. After an hour a halt, called the "pipe halt," was made, and the men were allowed to smoke for five minutes. At the dinner hour a rest was allowed for an hour, when the men ate whatever they had in their haversacks, and rested afterwards. During the remainder of the day the only halts were those which were made for five minutes at the expiration of every hour. The shoes which the French soldiers wore are said not to have been satisfactory, for the mud and dirt got into them in spite of the gaiters which were worn over them, and were a fertile source of blisters and sore feet. Commanding officers were enjoined to pay special attention towards obviating such casualties amongst their men, but nevertheless they suffered very much in that way. The carts and wagons of the peasantry were requisitioned to carry most of the baggage of the army, and the sick or offi-

cers travelling on special duty were provided with carriages by the same means. When the army passed monuments or tombs that recalled a brilliant achievement or the memory of some hero, the troops were called to attention and the officers saluted. The monument of La Tour d'Auvergne, who was styled "the First Grenadier of France," near Neuburg in Bavaria, was thus always treated with particular reverence by any body of troops approaching it, and his name represented the *beau idéal* of a chivalrous and thorough soldier to the French army of that time. Such observances tended to foster the soldierly spirit that then animated it. A lofty spirit of *esprit de corps* pervaded all ranks, and a display of personal courage evoked the warmest tribute of admiration, whilst anything like cowardice or lack of enterprise received well-merited punishment by a species of lynch law from the men themselves. Their generals and Napoleon himself set them a bright example in this respect, the brilliant Murat, a born cavalry leader, perhaps more so than any other. His handsome person, decked and bedizened in fur and lace, was ever visible far ahead of the line as it rushed on the foe, and it is said that he never returned from a charge without himself having taken an active share in the *mêlée*, and without having exhibited his preëminence as a swordsman. Ney's gallantry in action has become almost proverbial, and the way he led the last charge of the Guard at Waterloo one of the stock incidents of the battle. The order of the day, which was invariably issued after an engagement, if almost always expressed in pompous and exaggerated language, and sometimes conceived in what we should call bad taste, was nevertheless aptly suited to the minds of the audience, and never failed to appeal irresistibly to them. The soldiers were delighted when Napoleon told them that he was pleased and satisfied with their performances. They greedily listened as he recapitulated the incidents of the fight, and singled out for notice the most brilliant feats of his men; while, if he overstepped the bounds of truth in enumerating the number of prisoners captured or guns taken, his address wound up none the less effectively because of that.

A certain number of crosses of the legion of honor were then also usually distributed to each regiment engaged, of which the officers were allotted, perhaps, a dozen, and as many were given amongst the non-commissioned officers and men. The colonel decided who were to be the fortunate recipients, but the Emperor liked to present them himself, and thus enhance the value of the gift. The charm of his manner at such moments was most captivating. Each soldier was made to fancy that the Emperor had observed and specially selected him from amongst the crowd, and he carried away in his heart a few kind words that were never afterwards forgotten, and bound him by the bond of personal affection to his master. Sometimes, when the Emperor wished to produce a great impression, he would tear his own cross from his coat and pin it, with a few stirring words, on the breast of the grenadier before him. No wonder, then, that his presence with the army produced an electric effect; that the men followed him with the blindest confidence, and regarded him more as a beloved comrade than as a king.

But the soldiers were rewarded for their good behavior not by barren



honor alone. At the review which always succeeded a battle, the Emperor not only gave away crosses and decorations, but conferred the epaulets, which distinguished the officers, on those who were well spoken of by their commanding officers. And these latter, taking the cue from their leader, never failed to have a report ready for the occasion, couched in the same high-sounding words as his own bulletins.

These same reviews, interesting as they doubtless were in many respects, must, nevertheless, have often been looked upon as a great trouble and annoyance. After a tiring march, or a hard-fought battle, it must have been a severe tax on the men of the divisions or brigades who had to move forward to the place of assembly, and if the Emperor was expected at twelve o'clock we may be sure the soldier was already preparing for him at six, and was under arms on parade often some hours ere all was ready. Still, when at length the drums began to roll all along the line, and the familiar figure in green with the little hat was recognized riding up in the midst of a brilliant staff, from whose glitter he was distinguished by the simplicity of his attire, the effect was immense, and the shouts of "*Vive l'Empereur*" which greeted him were none the less hearty for the grumbling that had, perhaps, just preceded them. Napoleon delighted on such occasions to question officers and men as to the operations that had taken place, and liked to be replied to briskly and without hesitation, even if the answer were not strictly accurate. He always inquired as to the whereabouts of the absent, and was pleased when told that they had been injured by the bayonet. It therefore soon became the fashion to attribute most casualties to that weapon, although it is notorious that even at that time, when fire effect was comparatively small, bayonets were seldom crossed. Such inquiries, however, flattered and encouraged the men, and made them feel more than ever that they and their generals and their emperor were all members of one clan or family and were all in sympathy with one another. Their stubborn opponent, however, the British soldier, conquered under a system which ignored him in the distribution of honors or rewards. "*His life of danger and hardship,*" as Sir William Napier tells us, "*was uncheered by hope; his death unnoticed.*" Yet a sterner sense of duty animated his efforts, and sustained him under the trials and privations incidental to a reverse. It may be asserted that a British force would never have melted away and become disorganized as the French armies did in 1812 and 1815, and would never have so easily accommodated itself to the subsequent change of government. Personal ambition, competition to gain higher position, or to become rich, are inducements sufficient to prompt to soldierlike behavior when all goes well, but when hope has to be abandoned, some loftier motive must inspire the soldier to exert the self-denial such occasions call for. Bonaparte's proclamations to his army were often conceived in the spirit of a buccaneer, as when he said in 1796, "*Je veux vous conduire dans les plus fertiles plaines du monde. De riches provinces, de grandes villes seront en votre pouvoir; vous y trouverez honneur, gloire, et richesses.*" It is no matter of surprise, therefore, that his army should break up when his promises were unfulfilled, like a disappointed band of pirates. Finally, his marshals, who owed him everything, fell away too, and with some note-



worthy exceptions, either joined the cause of the Bourbons, or found excuses to hold aloof from military service altogether.

His own ends being in the main selfish, self-interest formed the keystone of the military fabric which he reared. The story of French success under his command well illustrates how much may be accomplished under such a guiding principle, but the tale of their reverses as unmistakably indicates how poorly it will in the long run compensate for the absence of the chivalrous and disinterested allegiance which religion, loyalty, or patriotism seldom fails to evoke.

## ARTILLERY FROM AN INFANTRY OFFICER'S POINT OF VIEW.

BY CAPTAIN T. D. PILCHER, NORTHUMBERLAND FUSILIERS.

*(A lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 12th March, 1896.)*

I SHOULD not presume to address this assembly on such a subject as mine were it not in the hope that by so doing I may encourage my brother linesmen to devote more time and thought to considering artillery questions. For it is only by studying the strong and the weak points of the other arms and by playing up to them that we can afford each other that mutual support which is absolutely essential to good results.

Many infantrymen have a fixed idea that there is some mystery connected with artillery subjects which cannot be solved by anyone not belonging to that arm, and, further, that it would be profanity in an outsider to try to solve these esoteric questions. That, however, this is not the case is proved by you having so kindly invited me, a linesman, to lecture to you here, at the Royal Artillery Institution at the headquarters of artillery in the British Isles on an artillery subject.

Coöperation between artillery and infantry has always been a matter of importance, but it is doubly so now that modern improvements have rendered artillery proportionately more effective and have at the same time made it practically impossible for attacking infantry under ordinary circumstances to drive defending infantry from a position until the latter have been thoroughly shaken by artillery fire.

Now, to be able to turn its attention to the hostile infantry, the artillery must first have gained an ascendancy over the hostile artillery, and let us consider what is necessary to enable it to do this. Some of the chief points are:

- A more careful use of the ground.
- Better fire discipline and accuracy of fire.
- Better matériel.
- Greater mobility.
- Greater numbers.

May be that I am wrong in putting a careful use of the ground first among the essentials for a good artillery, but it seems to me that fire disci-

pline, first-class weapons, mobility and numbers can be of but little use if we allow the enemy to make the best use of ground and fail in this respect ourselves.

To take a case in point, on an artillery tactical field day I once saw three batteries come into action on a high ridge, two on one side and one on the other of a group of high firs, and at once open fire at where they thought the enemy was. I say advisedly at where they thought he was, for they failed to discover him until they had been pounded by him for some five minutes, during which time they, in their exposed position, would have been shot to pieces. As a matter of fact the enemy was in position at a range of about 2000 yards on much lower ground, firing cordite and with a dark wood just behind him. It was no doubt principally owing to this last fact that he was so hard to discover. Now, no excellence on the part of the artillery could in this case have made up for the original fault in the use of ground made by the commander.

I cannot help thinking that we Englishmen, cavalry, artillery and infantry alike, trust too much to our instincts as sportsmen, and do not sufficiently study ground from a soldier's point of view. The Germans on the contrary look at ground only from a soldier's point of view, and although most of them would make a poor showing at finding their way over a nice piece of Leicestershire they are masters in getting the greatest use out of every fold in the ground. To be able to make the best use of a country in a military and in a sporting sense are neither alternatives, nor are they the same thing, but both require a quick eye, presence of mind, determination and courage.

A good man to hounds, who can ride his own line, is pretty sure to have these qualities highly developed, and they are essentials, but they are not everything or a hunt stables would teem with commanders if, however, besides these qualities an officer possesses coolness and a thorough knowledge of his profession, he is sure to inspire his subordinates with confidence and will be a leader of men with a grasp of his situation and an ability to act on it, not possessed by a man who has not been trained to seize his opportunity, either in war or in that pursuit which a great authority has declared to be its image.

If the careful study of ground be neglected with us, as I am inclined to think that it is, reasons for it are not hard to find. Half of our soldiering is done on the plains of India, where the flat ground offers but little scope for utilizing contours, and a great deal of the other half at stations like this (Woolwich) where the limited extent of government ground available makes its careful study impossible.

The above remarks apply equally to all branches of the services and certainly not more to artillery than to the other arms, but as artillery is the subject which we have in hand this afternoon, perhaps I may be permitted to describe the way in which German artillery come into action, for I have had opportunities of studying the German army, which have been enjoyed by few foreign officers.

The commander of a unit, whether a brigade, battalion, battery or company, is always blamed if he sticks too close to his unit when approaching

the enemy, he should, according to their ideas, ride away well in front, study the ground and watch how, where and when he can most effectively and with least loss lead his command into action. In accordance with this rule the artillery commander is well away in front and, having chosen a position, orders his batteries to be brought up. If the position be a hill the guns are unlimbered 20 yards behind the crest and are brought up as much further as necessary by means of drag-ropes. I have often watched a position on which I knew it was the intention to bring up the artillery and have seen neither man, horse, nor the sign of a gun until fire was opened simultaneously from all the batteries. One battery is not allowed to open fire until all are ready, lest by drawing the whole hostile fire upon itself it should be crushed in detail. All that one sees of the guns in such position is a flash from the muzzle, and it is extremely difficult to locate the position of a battery if one sees nothing but his flash. Only smokeless powder is used. If the ground and trajectory now admit of it (and it must be borne in mind that the trajectory of the German field-gun is a good deal higher than that of our 12-pounder) the guns are now further withdrawn and indirect fire is entirely resorted to. I may say that indirect fire with clinometer elevation is rather the rule than the exception. Clinometer elevation most decidedly is the rule, as it is considered that much better practice can be made with the *richt-bogen* or spirit-level than with tangent scale elevation. The *richt-bogen* is moreover invariably used with high explosive shell, with which a great nicety of elevation is necessary for good results.

Every gun also carries a *richt-fläche* or kind of a sight-rule on a pivot, which can be fitted to the gun in a second and which has attached to it an arc off which can be read the angle which the sight-rule directed on the auxiliary object makes with the line of fire. The following instance will serve well enough to illustrate the manner of procedure.

On a certain day at last year's manœuvres the western artillery was in position, when seven batteries of the eastern force galloped up and unlimbered behind the crest of a hill. From the guns of six out of the seven batteries the hostile artillery position was quite invisible, but it happened that it could be seen from Nos. 1 and 2 guns of No. 5 battery. These two guns were laid direct on the hostile batteries, and after they had been laid the *richt-fläche* was directed on a church steeple about a mile off and the reading passed to the other guns. When the guns had once got the direction in this manner, the point of a sword was laid against the off wheel of every gun, a rod stuck in the ground behind the gun and in line with the sights, firing was commenced and the gun laid back on the rod. The whole thing was done in much less time than it has taken me to describe it. Perhaps, however, the more ordinary manner of procedure is not the one above described, but is first to lay the guns directly and then to retire them, after having fixed the rod in the ground as above.

Twenty paces is the ordinary interval between guns, but I have often seen 40 taken with the intention of deceiving the enemy as to the strength of the artillery, for when hostile artillery is a mile off and all that is seen of it is a flash from the muzzle, it is very hard to say at what interval the guns are placed.

I have tried to describe the manner in which German artillery come into position when good positions are to hand and the guns are not over crowded. I have, however, when positions have been limited, seen guns in action with only 10 paces interval, but it is considered as the result of experiments that artillery with guns at 10 paces will suffer four times as much loss as with guns at 20 paces. A smaller interval than 20 paces is consequently never resorted to if it can be avoided.

I have also seen two, and on one occasion three tiers of fire used. On the latter occasion the ground sloped about one degree to the front, and there was about 300 yards distance between lines. Guns were firing at artillery, range about 2500 yards, and they were firing over a valley.

When once established in a good position, the German artillery are most averse to leaving it, and I have never, at German manœuvres, seen the artillery brought up close to the infantry line previous to an assault. What the artillery does do previous to and during an assault is to redouble its fire, giving 200 or 300 yards more elevation and length of fuse in order to catch the hostile reserves moving up, and to preclude the possibility of hitting its own assaulting troops. The argument is used, that it benefits the infantry but little to have moving targets composed of their comrades of the artillery galloping about behind them, whereas the continuous fire of their guns is of the utmost value to them. I have talked to many officers, who were through the Franco-Prussian War, on this subject and have invariably been told that the occasions on which guns pushed up to within infantry range to support the attack were exceptional, and that when they occurred, some specific object was in view, as to knock down the walls of Fröschwiller at the battle of Wörth, which, owing to the configuration of the ground, could not be bombarded from a distance, and behind which the French were making a last stand. In answer to a question of mine on this subject, I have just received the following answer from a distinguished German officer which rather modifies what I have just said. He says: "I am of opinion that both in attack and defense artillery must not be exposed to infantry fire at the commencement of an engagement, or until the hostile infantry have suffered and been shaken. In defense artillery should if possible be 500 metres behind the infantry. Nevertheless it may be advisable in the attack just before the assault to send forward a few batteries into the foremost line. This procedure is also admissible in the defense to defeat the hostile attack. The moral effect of artillery in these circumstances will be very great. In these cases we may consider the hostile infantry as thoroughly shaken, and with shaken infantry one may dare to take liberties." But I must adhere to what I have said and I have never seen this done at manœuvres.

There are no hard and fast rules regarding tactics in Germany. Ground cannot be altered and formations can, and that formation is considered best which is best adapted to the actual ground and to the circumstances of the individual case. In conformity with this principle attack formations for infantry are never allowed to be practiced. A general officer, whose opinion on tactical matters is highly valued, and with whom I have had the advantage of very many long talks, once said to me, "I divide commanders into



two : Firstly, those who devise attack formations and apply them to the ground whatever it may be. Secondly, those who take the ground as it is, and who can on the spot make the best use of it. 'The former I do my best to rid the service of, the latter are my men.'"

Before leaving the subject of ground I should like to remark on the manner in which the Germans prepare positions for defense, but do not occupy them until the enemy has definitely shown his hand. Nothing is blamed more than a too early deployment either in attack or in defense. Let me quote the following example of what I mean. On the last day of the manœuvres at which I was last year present the division to which I had attached myself had received warning over night that it would probably be attacked next morning by a much superior force, and that it could not expect reinforcements until mid-day. It had consequently taken up a defensive position, shelter trenches were dug and gun-pits thrown up behind them. Three artillery positions were prepared, one facing S.E., one S. and one S.W. There were only two brigade divisions, *i.e.*, to sufficient batteries to occupy two out of the three positions prepared. Only a very thin line of infantry was thrown into the trenches, just enough to prevent inquisitive hostile cavalry coming up too near, and the whole of the rest of the force was kept in reserve under cover. Officers commanding sections in the line of defense receiving most definite orders not to occupy any part of the line in force, until it was beyond doubt that the enemy meant to attack it. There was excellent cover, a quarter to half a mile, behind the trenches.

Later on this same day it became evident that the enemy had 20 batteries and four infantry brigades, whereas the defending force consisted of six batteries and two infantry brigades. I asked the officer commanding the defense how long he thought he could hold out until support came. He said, "the mist to-day helps me, but on a clear day I could not hold out more than two hours in the face of the enemy's superior artillery fire," and turning to the officer commanding artillery, he asked him his opinion. He said, "I think, sir, you have over stated the time, I would not give you more than 1½ hours." This shows the enormous weight laid by the Germans on artillery fire. The hostile artillery positions were no better than those of the defense, and the defensive line of trenches was a very strong one, with a clear field of fire.

It is the rule for artillery in position to reconnoitre to its flanks by means of officers. On one occasion which I can call to mind this was not done and this neglect was severely criticised, for had an officer with glasses galloped half a mile to the flank he would have discovered the hostile artillery massed at about 3000 yards, behind a hill and well within reach of indirect fire.

From the question of ground we come to that of fire discipline and accuracy of fire. The rules as to the massing of guns, which obtain here obtain in Germany also, but great stress is always laid on keeping the whole of the troops firing at you under fire, for it is considered that the effect of the enemy's fire decreases 50 per cent. directly he hears bullets whistling about his own head.

At ranges over 1500 yards the guns of a battery fire in turn, at ranges under 1500 yards they fire independently.

No range-finders are used either for artillery or for infantry and German artillery officers say that their shells are the best range-finders.

The only missiles used by artillery are shrapnel, high explosive shell and case. The shrapnel has a combination time and percussion fuse, and contains a smoke-making substance, the smoke from which hangs together and rolls away like an old-fashioned cannon ball, and is very distinctly visible indeed. The use of this smoke-making substance lessens the difficulty of range-finding immensely.

The chief use of high explosive shells with field-guns is to reach troops behind trenches and earthworks, which would give them cover from ordinary shrapnel fire, and the manner of procedure is to burst the shell immediately over or just behind the cover, the force of the high explosive overcoming the velocity of the shell and sending the contents of the shell in all directions.

Firing at shelter trenches field-guns have a very fair effect when fired with time fuse, and much better than howitzers, mortars or garrison guns fired with percussion fuse at the same objects. The latter fire too slowly and have to drop their shell right into the trench for it to be effective. High explosive time-shells would at all events make it so disagreeable for infantry in a shelter trench that they would not stay still to be shot at without showing themselves, and if they showed themselves the object would be attained and shrapnel fire could be commenced. Two things are necessary for good effect with high explosive shells: Firstly, the length of fuse requisite must have been carefully ascertained with shrapnel. Secondly there must be plenty of ammunition. High explosive shells from guns and howitzers dropped into the ditch of a modern earthwork will demolish everything for yards in every direction.

The Germans expect much better results against troops in the open with ordinary than with high explosive shell and will never use the latter unless the enemy cannot be reached by the former.

I should like now to give a short description of the *platte*, a little contrivance which is generally made use of when firing with the tangent scale and which renders it possible always to command the same distance for the time fuse and for the sights, thus avoiding confusion.

The time fuses are marked in yards, not in seconds, the fuses are inclined to burn too long, *i. e.*, if timed to burst at 1500 yards the shell is pretty sure not to burst under that distance, but under certain atmospheric conditions will often not burst until the shell has travelled 1600 yards.

It was found formerly, when it was occasionally necessary, to give an elevation for say 1500 yards and to use a time fuse for 1400 yards that mistakes were liable to occur, and in order to obviate this a *platte* is now used.

Under the above conditions the order would now be 1400 yards with two *platte*. The *platte* is a thin piece of metal which fits round the bottom of the tangent scale and obscures, roughly speaking, the last 50 yards elevation written on it, *i. e.*, if put into this diagram one *platte* would obscure the figures 1600 and the sight would

600
700
800
900
1000
1100
1200
1300
1400
1500

*Platte.*

read 1550 yards. One *platte* is equivalent to about 50 yards' elevation.

The advantages of this method are obvious, as they preclude the possibility of a slip of the tongue or of a misunderstanding from two distances being named. When using the *richt-bogen* it is also possible to command only one distance. Atmospheric conditions or differences in height between the gun and the target being made up for by the use of a screw which alters the lie of the spirit-level.

It is not my intention to enter into the much contested questions regarding the respective advantages of a small-bore high velocity and heavy carriage, as against a larger bore lighter carriage and less muzzle velocity, but I should like to mention a few of the most salient points in which German matériel differs from our own.

There is about 47 cwt. behind the horses going into action in a German field-gun; in one of our own about 45 cwt. A German battery has nine wagons, two of which contain high explosive shell, each wagon contains 75 shell and there is about 45 cwt. behind the horses. We have six wagons per battery, each containing 72 shell, and there is about 42 cwt. behind the horses. A German battery carries 140 man-killing projectiles per gun, excluding case, 115 of these are shrapnel with time and percussion fuse and 25 of them are high explosive. We carry 80 shrapnel and 20 common shell, but the amount of ammunition carried is being increased. The bore of the German gun is 3.5", of ours 3". Our shell and fuse weighs 12 lbs. 8 ozs. and contains 180 bullets. The German shell weighs about 18 lbs. and breaks up into 300 pieces. Nothing but smokeless powder is used with German field artillery.

Our gun has the greater muzzle velocity and the flatter trajectory, the German gun has the greater searching effect even with its ordinary shrapnel shell. There is no question that our guns are better horsed than the German and their mobility is greater. The Germans cannot turn out their horses, guns or harness anything like as smartly as our gunners do. It is marvellous how the Germans manage to get the amount of work out of their comparatively badly bred animals, which they undoubtedly do get out of them, and the reason they manage to do so is principally attributable to their excellent system of buying their horses as four-year-olds and keeping them in the riding school until they are six. They very seldom cast a horse until he is 18 and often not until he is over 20.

Whether we do not sacrifice too much to lightness having as we undoubtedly have better horsed artillery than any on the continent is a question I will leave to artillerymen. I say advisedly than any on the continent, for in this respect all accounts tell us that the Germans are far ahead of their possible antagonists. Whether also our present turn out does not necessitate too much time being devoted to spit and polish is a question which I will not enter into.

We now reach the subject of numbers. In the German army the proportion of guns to rifles is between five and six guns to 1000 men and the tendency is to increase the number of guns. At present the artillery is directly under the corps commander, but it is contemplated to split up regiments and to allot one artillery brigade of two regiments to each infantry

division. As I have already said enormous worth is in Germany laid on artillery fire. What the number of guns per 1000 men is, which we can afford to our regular and auxiliary infantry is no doubt known to most of my audience better than it is to me.

There are still a few remarks which I should like to make upon some points which I saw in Germany and which I consider to be of interest.

On the line of march the artillery generally followed the leading battalion, but in the case of a long line of guns a couple of companies were put in between every fourth and fifth battery.

A cavalry escort invariably accompanied artillery moving into position. When once in position the cavalry were usually relieved by infantry, unless there happened to be other troops in the immediate neighborhood, in which case no further escort was provided, it being laid down that it is the duty of the nearest troops to secure the safety of the guns. In the case of a special infantry escort this escort was usually thrown out in front of the guns.

For artillery to fire over the heads of infantry was not the exception, but the rule, being done every day. Sometimes the artillery in position and firing was only 150 yards behind the infantry line, and it must be borne in mind that the Germans only practice that in peace which they mean to carry out in war.

On a certain day at last year's manœuvres a rear-guard action was being fought and I was much struck by the masterly manner in which the artillery used the ground, never letting the attacking infantry within 1200 yards of them and retreating from position to position, hardly exposing themselves to fire and always, when in action, keeping their horses under cover. It is considered that in a delaying action infantry should never allow hostile infantry to get within 600 yards of them, for that if they do so they will find it impossible to withdraw.

The key-note of the whole German army and the secret of its efficiency is decentralization. This begins from the bottom and works up. From the day an officer joins he is accustomed to responsibility. Commanders of squadrons, batteries and companies are practically independent, their immediate superiors may inspect them, but are forbidden to lay down what parades they shall hold. At manœuvres I have never seen any interference on the part of battalion or regimental commanders with their subordinates, a man receives his orders and he is allowed to carry them out his own way. An officer is often asked afterwards why he did so-and-so, and is either praised or blamed for his correct or false appreciation of the situation. It is acknowledged that in war a company once committed to action is like an arrow from a bow which can only be gathered when the ground over which it was sent has been won. It is acknowledged that the only way of sending up orders to the firing line will be through reinforcements and when a company is once committed to action the commander is independent.

If an officer is found to be unfit for his responsible position, and every post carries with it a great deal of responsibility, he is retired with a small pension, and this is a matter of every-day occurrence, a great number of compulsory retirements taking place in the lower ranks.



This system of decentralization immensely lightens office work. There are two staff officers to a division, each of whom does on an average two hours office work a day, for hardly anything gets as far as the divisional office and still less goes past it. But to return to the subject of my lecture from which I fear I have diverged.

There are one or two points on which I should—if I am not delaying you too long—like to say a word or two.

It is a disputed point at what distance infantry on an equal front will be able to get the better of artillery and the following results of firing at long ranges may be of interest. At Meean Meer at 1900 yards at two targets, each  $8' \times 12'$ , 1360 rounds were fired, these rounds could have been fired comfortably in four minutes by 100 men, there were five hits, that is .36%. At Karachi at 1300 yards at a target representing five guns, 20 gunners and also two screens  $2' \times 12'$ , representing an escort, 620 rounds were fired, there were 15 hits, *i. e.*, 2.42 per cent., this would represent the fire of 100 men for two minutes.

I should like to quote the opinion of a distinguished German officer on this subject in writing to me, he says: "We are of opinion that at 1100 yards and at all nearer distances infantry will get the better of artillery, if both open fire simultaneously, and that they will gain the upper hand even if the artillery are able to provide cover for their men up to their waists. It is only when ground is so formed that the guns only show their muzzles above the crest that artillery can fight at such short ranges."

There is no doubt a great future for machine guns, and as the results which I am about to quote will show a machine gun is at practically all targets equal to the fire of 30 rifles, and at some targets equal to a great deal more. One great advantage they have over infantry is that you can see with them where your bullets are going and can range, moreover, being as they can be in the charge of picked men, the chances are that hits in war will bear a better proportion to results obtained in peace than would be the case with ordinary infantry fire.

In no way can machine guns take the place of artillery in European warfare any more than they can supersede infantry. They will, however, if properly used, be a most valuable adjunct to infantry and in many cases, such as holding a defile, guarding a flank, etc., will often free half a company. Moreover it would be difficult to exaggerate the effect which, under certain circumstances, a few determined men with a machine gun and a bill-hook to improvise a little cover from view, could have on an advancing column. Cavalry, however good they may be, cannot search every bush in an enclosed country and a machine gun does not take much concealing.

The following comparative results of machine gun and rifle fire made at Hythe last autumn may be interesting.

Target a battery of six guns, 54 gunners, six limbers, six ammunition wagons at five ranges between 1550 and 1700 yards. Firing 633 rounds, which they could fire in one minute, two machine guns got 81 hits on, including 17 on the gunners—40 men firing 600 rounds at the same target, which they could fire comfortably in about five minutes, got 53 hits on, including 18 on the gunners. The percentage of hits on the whole target,

guns, limbers and gunners was in the case of the infantry, 8.83, and in the case of machine guns, 12.79.

We may calculate that in either of the cases just quoted about 15 gunners, *i. e.*, 28 per cent. of the men of the battery were hit. The distance was found with a mekometer previous to opening fire. It may be presumed that the 40 men shooting were all picked shots, or they would not have been at Hythe.

It probably took about one minute to get the range with the mekometer.

I think that we may safely conclude from the above experiments that at ranges over 1000 yards, and sometimes as great as 1700, both infantry and machine guns may reasonably expect under favorable circumstances to make it extremely hot for a battery, if they are already in position when the battery comes into action, and they will have the great advantage that they are usually much more easily concealed than artillery, and they may inflict heavy loss without the enemy knowing whence the fire is coming. I am speaking of the exception, for there is no doubt that under ordinary circumstances artillery can, even in peace in a given time with a given frontage produce more effect on a target than infantry can at ranges much over 1000 yards.

There is great difficulty in deducing from peace experiments what is likely to be the effect of fire in war, for here human nature has to be taken into consideration and this is a factor for which we cannot legislate. All experience teaches that only a very small percentage of the effect produced by a body of troops firing in peace can be expected in war, and that percentage will vary in proportion as the troops firing are well or badly disciplined. Whatever the above percentage is with infantry, it should be greater with artillery, who for many reasons are less influenced by the altered circumstances of the case. This fact must be borne in mind in connection with the comparative effect of artillery and of infantry fire at more or less similar objects in peace.

The following are, I think, among the chief points which strike an infantryman when first seeing artillery practice. Knowing how very easy it is with a rifle to fire to the right or to the left, infantrymen find it hard to believe that the lateral error of artillery is "nil" and that the depth covered by shrapnel is as great as it is. Perhaps it is owing to this fact that we so often at manœuvres and on field days see infantry advancing in fours within easy-artillery range.

Again an infantryman is apt to forget the great difficulty which artillery will undoubtedly have in ranging in war, and the enormous difference which the ground on which shell burst makes to artillery in finding their range, and consequently an infantryman is also apt to forget the necessity (insisted on in the drill-book) for infantry in their advance to avoid prominent objects on which artillery find it easy to range. On this point I should like to remark that the smoke-making substance in the German shell which makes the smoke hang together after the shell has burst, when fired either with time or percussion fuse, must immensely facilitate ranging on difficult ground.

In considering artillery questions an infantryman is also apt to forget the difficulty which artillery will have in observing the effect of their own fire at long ranges, and also their difficulty in distinguishing their own from the enemy's troops, and in this respect he is inclined to attribute to them powers of vision and of discrimination, which are more than human.

Modern guns firing shrapnel have never yet had an opportunity of showing what they can do on a battle-field, and one of the first surprises of the next European war will be that we shall hear that artillery, under favorable conditions, have within a quarter of an hour swept away half an army corps.

In conclusion I have only to thank you for the kind manner in which you have listened to me and to assure you that if I, an infantryman, have said that I see a moat in my brother's eye, that I am perfectly aware that there is a beam in my own.

#### DISCUSSION.

MAJOR E. S. MAY.—Sir Redvers Buller and gentlemen, I wish some one better qualified than I am had been called upon to open the discussion which is sure to follow so excellent a lecture as the one we have just heard; but since it has fallen to my lot I feel I cannot do better than commence my remarks by assuring Captain Pilcher of the great profit and pleasure with which I have listened to what he has had to say; and I am sure I can speak for all of you when I tell him how glad we are to hear an infantry officer lecture in this theatre, especially when he deals with a subject which appeals particularly to us, and brings with him so much valuable information. There are a great number of officers, I have no doubt, who wish to enlarge on different points this evening, so I will confine myself to one or two, speaking, I trust, in no critical or controversial spirit, but rather seeking for further details which may clear some doubtful matters up. The thing that puzzles me a little and which I feel most interest in personally, is this high explosive shell which Captain Pilcher has alluded to. I think we all recognize the value of such a projectile in this country, and personally I have always been an advocate of howitzers, but we have had a certain number of very serious difficulties to contend with hitherto in connection with it. It has been recognized first of all that this high explosive shell, unless fired with a very low velocity, may burst prematurely and that, if such a thing occurred, it would probably shatter and destroy the gun altogether. I should like to know whether, and if so, how, the Germans have completely got over their difficulty in that respect and if they are not troubled by our anxieties. Then there is a difficulty with regard to ranging with high explosive shells. The high explosive gives off hardly any smoke—the burst is shown simply by a flame—it must often be extremely difficult to see that flame, and unless there is some smoke-producing compound included in the shells I find it difficult to understand how they can pick up the range for us, especially when fired in the air with a time fuse. Moreover the presence of adjacent batteries or guns would not greatly facilitate the task. Because we must remember that although we might have a battery firing with ordinary field-

guns exactly alongside one using these high explosive shells, unless the same fuses were used to ignite them and the ordinary shrapnel, I do not see how its experiences would help us very much; we all know that, even if we fire with fuses of exactly the same pattern, there is the error of the day to be accounted for in the case of the fuses as much as in the case of the powder charge, and that the same pattern fuses unless of the same date of manufacture do not always burn at the same rate, and where the fuses were not of the same pattern, as I presume they would not be in the case referred to, it seems to me that the results obtained with one battery would help you very little with respect to another. And again, do the Germans use a high explosive in the shells of their ordinary field-guns? Because in this country, I think I am right in saying that the best authorities do not regard a high explosive from so small a gun as a 12- or 15-pounder of very much account. Even with the largest field howitzer hitherto introduced I do not think that the diameter of the circle which may be taken to represent the area over which the high explosive operates is more than about 30, or at the outside 40 yards; it has indeed been put as low as 10 and 20 yards, although that is probably a false estimate. When you consider the depth that the shrapnel covers effectively I think it is easily understood that if you only made use of a small shell, such as an ordinary field-piece fires, you would get a very small destructive area and must lose a great chance of hitting men. These are some points I wish to ask Captain Pilcher about particularly.

Then there is another matter that needs clearing up and upon which the lecturer with his foreign experience may be able to enlighten us. Do the Germans when a small body of troops is concerned, attach artillery to the advanced guard? By a small body I mean a force of a division or thereabouts. There is nothing laid down in our official manuals upon that point; but I have noted that some books on tactics in this country say that it is right to attach two guns to the advanced guard of a division. The idea of breaking up a battery will hardly commend itself to any of us; and I understand the French do not allot any artillery at all to an advanced guard if it be smaller than an infantry division. It would be interesting to hear what the German practice is.

Finally, perhaps, I may be allowed to mention a question connected with infantry and artillery tactics which rather interests me. The other night I was lecturing myself to an Infantry Tactical Society and I was asked during the discussion which followed by an infantry volunteer colonel, "How do you recommend infantry to attack artillery?" Now I do not think it would be of the slightest interest to anybody here to know what answer I gave; but I dare say many would like to hear what Captain Pitcher has to say upon that subject and so I will pass the question on to him, if he will let me. I may, however, say this, that I cannot think the cut and dried procedure we sometimes see at manœuvres is a judicious one. An infantry attack is broken up into five lines altogether, and it can hardly ever be right for them to advance straight on the guns as we sometimes see them do. There is a first line, a second line and a third line in the orthodox formation, and the first line is further to be sub-divided into three



parts, firing-line, supports and reserves. I think when those five lines come rolling on that, if we do not hit the first we may expect to hit the second, and if we do not hit the second we ought at any rate to hit the third, if we did not, the fourth at least should receive the benefit of our shells, but, if it did not, and the fifth escaped also, then indeed we should have cause to blame our ammunition.

CAPTAIN J. HEADLAM.—Sir Redvers Buller and gentlemen, there is so much that is interesting in Captain Pilcher's lecture and I agree so fully with the greater part of what he has said, especially as to the necessity for the most cordial coöperation between the artillery and the other arms that I feel as if it would be rather ungracious to criticise. At the same time there are some points in the lecture in regard to the training and equipment of German field artillery which, if they were left without remark in such a meeting as this, might naturally give the impression that in those respects the Germans were ahead of us. I believe the contrary to be the case. The first point is the equipment itself, the general question of the weights and the amount of ammunition carried. Captain Pilcher said that the weight of the German shell was about 18 lbs., the weight I have always heard of is 15½ lbs., whichever is right, it is, of course, a heavier shell than that of our 15-pdr. The number of rounds per gun carried in a German battery is 147, in our 15 pdr. equipment it is 144. But to carry their extra three rounds a gun they have nine wagons instead of six. You must remember that these nine wagons are not with the battery, or even with the brigade division, four only are with their batteries, the remainder are behind the whole artillery unit; that is to say, behind all the divisional, or all the corps artillery you have this great mass of wagons, in the case of corps artillery amounting to 40 wagons. That is not quite the same thing as being actually with the batteries. It certainly seems to me that we are better off with 144 rounds and six wagons, than the Germans with 147 rounds and nine wagons. In the horse artillery they have indeed got a considerably heavier shell, but they have also got 6 or 7 cwt. more than we have behind their teams and only 32 rounds with gun and limber while we have 50. I am sure that all horse artillerymen will agree with me that for horse artillery requirements our equipment is far superior.

The other point I wished to touch upon was the training as regards fire from behind cover. The lecturer has said that with the Germans now this fire is practically the rule and he has described to us the instruments used. They are in my opinion very interesting but very complicated; the French, I believe, have still more complicated ones, the Italians also and I daresay the other nations. What I want to assure officers, and I have practised with these German instruments, is that our aiming posts will do all the work that the *richt-fläche* does very much more simply and accurately. But the question of what instruments you use is not important, we all know that under favorable circumstances you can make very accurate practice from behind cover. It is to the use of such practice on the battle-field that I believe there to be such strong objections as to render any general employment of it absolutely out of the question. To begin with, it is very rare to find ground where you can carry on the practice with more than a

single battery. Besides that you cannot change your target without making all sorts of elaborate arrangements, you cannot concentrate your fire and you cannot fire at moving targets at all. Those are, to a certain extent, technical objections. There is a very much stronger one and that is the moral objection. If you train field artillery to consider firing from behind cover as "practically the rule," I believe you will destroy the whole spirit of the arm and I cannot help thinking from what the lecturer has said, that that is what is occurring to some extent at any rate in Germany. The lecturer says he has never seen in the manœuvres the German field artillery accompany the infantry in attack; he certainly read a letter from a distinguished German officer who pointed out that some persons, at any rate, considered that they should do so; but, if the lecturer has never seen it done, it must be sufficiently rare and if batteries do not do it at manœuvres, will they do it on service? In the Franco-German War there were many occasions where the artillery came up to very close ranges, not only for such special purposes as the lecturer has mentioned. For instance, in the battle he has referred to (Wörth) the batteries prepared the way for the assault of Elsasshausen by their fire at very close ranges, and then when the village was carried and the German infantry, as the official account admits, was absolutely unable to withstand the French counter attack, two batteries of horse artillery coming into action on the ground just won, stopped that attack with ease. I know that I am not alone in thinking that such occasions will occur again, and I firmly believe that if in manœuvres you train batteries continually to use fire from behind cover, and to remain in their positions while the infantry advance, when in war occasions arise for their use at close quarters they will not be there.

In conclusion, there is one question I should like to ask; the lecturer has spoken about firing in tiers—sometimes two and three tiers—I should like to know whether the German artillery ever fire in tiers in reality at practice, or only with blank at manœuvres.

MAJOR H. C. SCLATER.—Gentlemen, there was one point which the lecturer dealt with for a considerable time and that was the question of long range infantry fire and the effect likely to be produced by infantry firing upon guns. I may mention that I was very much interested last year and the year before, in some small experiments instituted by Lord Wolseley, then commanding in Ireland, which took place at Glenbeigh in connection with this subject, from which we all got a great deal of instruction—both infantry and artillery. In Ireland there was at that time no infantry range upon which long range firing could take place, though that is being remedied now, whilst in England the ranges are few; and I would strongly urge that our artillery ranges should be utilized for combined field firing by infantry and artillery, and that a detachment of infantry should also be present during at least a portion of the period when gun practice is being carried on. Their presence being utilized by firing at various ranges at targets such as artillery would represent on service, and from which gunners would derive much instruction as to what they might expect to encounter on service, and enable them to draw tactical deductions therefrom; such practice could not fail to be of interest to the infantry, as giving them the oppor-

tunity of ascertaining the vulnerability of an artillery target, and the best way to attack it. The general deduction we drew from our experiments was that horses should not be brought within 1500 yards of steady infantry when coming into action or on the march. When limbering up at that range difficulty would be experienced and if you come into action against infantry in position who were not being fired upon by anybody else at ranges under 1500 yards you would lose most of your horses or a great number of them. With regard to the gun detachments we found that at 1200 yards but small results were produced by very carefully aimed volleys from a line of rifles occupying much the same front as the guns they were attacking, but when they got to 1000 yards the detachments began to lose fast, though with well posted guns and detachments it seemed as if the guns could be fought for some time. Beyond 1500 yards the effect of long range rifle fire rapidly diminishes, as a rule the fall of a bullet cannot be seen, and except at large targets and when ammunition is abundant it is not worth the expenditure of the ammunition. Some good practice was made at a target representing a battalion in quarter-column at a range of 1800 yards, but very poor results against guns in the open at this range. Beyond this range results were practically nil. It is perhaps worth noting that even last year there seemed to be quite an open question as to the best way of firing these long range volleys, the size of the fire unit and what the system of distribution of fire should be adopted, we also noticed that better results were obtained when the volleys were fired quickly with little interval, than when fired deliberately with careful working by N.C. officers and officers. These questions were much discussed by the infantry officers who were present at Glenbeigh at the time, including the officers of one of the courses which was then at the camp. Such combined practice cannot fail to be of interest to all concerned and I trust that it will be an annual institution at all our camps.

LIEUT.-COLONEL R. W. RAINSFORD-HANNAY.—Sir Redvers Buller and gentlemen, a good deal has been said about high explosive shell this evening. The following paragraph taken from a lecture delivered by Major Shewell, R. A., at the Royal Engineer Institute, Chatham, gives I think a very good summary of the general opinion of the use of high explosive shell as an auxiliary to the fire of field-guns. "Against troops in the open high explosive shell do not, and can never be expected to equal good time shrapnel, in which control can be exercised over the direction, force and size of the bullets, which is not possible over the pieces of a high explosive shell. Howitzer fire of shrapnel with its high angle of descent and low velocity is of little value for any purpose. Thus the high angle fire of high explosive shell, though it can well supplement, can never replace the direct fire of field-guns."

Then, gentlemen, the lecturer has shown us a contrivance by means of which the Germans can use their tangent scales and fuses at the same reading in yards. I do not see that it is simpler, or more easily managed, than our own system of having a different notation for tangent scale and fuse and it does not appear to be applicable to clinometer elevation, of which the German artillery make considerable use.

We have had a good many statistics given us of the effect of long range infantry fire upon artillery. The following details of an experiment carried out at Lydd in July, 1894, showing the relative power of field-guns and rifles at long ranges may be interesting :—

Target, a field redoubt, 25 dummies were placed on the banquette with their heads showing over the top of the parapet, 25 dummies behind the rear casemate, range 1050 yards, number of bullets 5000.

This was fired at by 200 infantry with Lee-Metford rifles ; ranging volleys were carefully fired by sections. The general results of these volleys could be fairly well seen by the dust thrown up by the shingle where the bullets struck. Result 49 hits on 24 dummies. The same target was attacked by a 12-pdr. B. L. gun firing a 15 lb. experimental shrapnel shell with time and percussion fuse. The shell being experimental, the officer in charge of the experiment had no range-table nor had he a fuse scale, therefore many of his rounds were used in ranging. Range 1850 yards, rounds 20, giving a total of 2200 bullets. Result 26 hits on 17 dummies. The infantry fire was most deliberate and took an hour. The artillery fire too was slow and took 15 minutes.

Tabulating these results we find—

Range	about	2 : 1	in favor of the artillery.
Time	“	4 : 1	“ “ “
Personal	“	20 : 1	“ “ “
No. of bullets	2 : 1	“	“ “
Hits	1 : 2	“	“ “

Now multiplying these ratios together, as you do to get the resultant of a combined system of mechanical appliances, we get an advantage of 160 : 1 in favor of the field-gun (laughter and applause).

COLONEL G. H. MARSHALL.—Gentlemen, the lecturer, in speaking of the Germans, said great stress is always laid upon keeping the whole of the enemy's troops under fire, for it is considered that the effect of the enemy's fire decreases 50 per cent. directly the soldier hears bullets whistling about his own head. This calculation must be of course a surmise ; but granting it is true I would like to know what is the result. I think it comes under the head again of what Captain Headlam mentioned ; it is merely another form of cover. If a general orders his artillery to come into action he wishes for some effect ; he wishes either the enemy's guns to be silenced, or for some crushing concentrated effect upon the enemy's infantry ; I do not think he would be satisfied if he found his artillery frittering away their fire and that they were quite satisfied because they were receiving 50 per cent. less damage. I had hoped that this question had been finally settled. Many of us will recollect the very interesting discussion which took place in this room between an officer who was an exponent of the German ideas and the general officer now commanding this district.

The lecturer has put it to us to decide whether we do not spend too much time on “spit and polish.” We know that the words “spit and polish” are used by many people as a term of reproach, meaning that the soldier is devoting too much time to the appearance of his arms, accoutrements and horses. In this matter I think that the soldier should not be



judged differently from the civilian. If your coachman brings your carriage and horses to your door with your horses badly groomed and everything slovenly turned out you do not commend him or raise his wages; you probably get rid of him as careless and inefficient. Many batteries come under me every year at Okehampton, my experience is that in a battery where the officers and men are well dressed, the horses, harness and equipment smartly turned out, these are signs of energy and zeal in essentials as well and that such a battery will also excel in drill, manœuvring and shooting.

## REPLY.

CAPTAIN PILCHER.—Gentlemen, the first question that Major May asked was about the premature burst of the high explosive shell. In every brigade division in Germany one battery has new pattern guns. I think the pattern is 1892. These guns are made of some peculiar new steel and the high explosive shell bursting in the barrel will not damage the gun. The other batteries of that brigade division do all their firing with high explosive shell out of the guns of this battery. In war the other batteries will have to take their chance until they all get the new pattern gun. It is, however, considered that the chances of a shell bursting in the gun are so small that there really will not be a great deal of risk run. In firing high explosive shell they range with ordinary shrapnel, containing the smoke-making substance, which I have tried to describe and I am practically certain that they use the same fuse. The battery that is going to fire the high explosive shell first fires for itself with ordinary shrapnel shell and gets the exact length of fuse requisite. These experiments that I have spoken of were carried out with an ordinary field-gun, not with a howitzer. It is only when they cannot get at troops with ordinary shrapnel that they fire high explosive shell. They acknowledge that the effect with ordinary shrapnel against troops in the open will be very much greater than with high explosive shell.

I have never seen artillery with an advanced guard when the force has been less than a division.

With regard to the question of "How do infantry attack artillery?" I think there is only one answer, and that is that it must depend upon the ground. Certainly the very worst thing that could be done would be to advance in lines one behind the other, but surely against infantry fire the same rule holds good, for with an infantry bullet there is even a greater dangerous space than with the bullets in a shrapnel shell. The Germans carry 140 rounds, but I think I made a note of that just now.

CAPTAIN HEADLAM.—147 rounds I think. That is including the nine wagons.

CAPTAIN PILCHER.—Yes, and the case too. I purposely did not include case.

CAPTAIN HEADLAM.—Yes, I think so.

CAPTAIN PILCHER.—In speaking of our batteries, Captain Headlam should, I think, have said, when contemplated alterations have been carried out our batteries will carry 146 shell; there is great difference between the present tense and the future. Captain Headlam in speaking of our equip-

ment has spoken of what will be, I have only spoken of what is. I have never heard the Germans speak of the *richt-bogen* and *richt-fläche* as being complicated, they certainly did not take long using them. The *richt-bogen* is an instrument they invariably use,

CAPTAIN HEADLAM.—I did not say a word against that.

CAPTAIN PILCHER.—The *richt-fläche* is not really used very often. I quoted an instance, but I said afterwards that the ordinary mode of procedure was with a couple of rods. It is all very well to talk about training your men to imagine that they are going to be shot to pieces and teaching them to expose themselves; but if the men do expose themselves unnecessarily and are all shot, there will not be any left to fight. There are many occasions when we must all expose ourselves, but we should not do so unless it is impossible to obtain equally good results from under cover. It must also be borne in mind that troops firing from under cover will be firing under what are comparatively peace conditions and this will make a great difference in the accuracy and effect of their fire.

To make good use of ground and to get good results from indirect fire is difficult; to come on to a crest (in peace) and to fire directly is easy. Practice the more difficult, the easier part will come of itself.

With reference to tiers of fire I have been asked whether it was at manœuvres that I saw them employed. Yes, it was at manœuvres, and I saw them placed in the same way as they would be placed in battle. I do not see why artillery should be afraid to fire over their own heads, when it is regarded as a matter of course that they will fire over the heads of infantry. I asked a question the other day respecting tiers of fire, and the officer whom I mentioned just now kindly sent me the following notes, he says, "In artillery positions the first thing is effect; cover is of secondary importance. The configuration of the ground must determine these points. We use tiers of fire, when the ground allows it, in order to decrease the effect of the hostile artillery fire. We wish to oblige the enemy to range on every single battery. The control of fire must however remain in the hands of one man, and on account of the effect of fire, intervals and distances should not be diminished. It is seldom that ground fulfils all the conditions necessary to enable us to use tiers of fire."

I was much interested just now when Major Sclater said something about Glenbeigh. Captain Crampton very kindly showed me a valuable report he is drawing up upon this subject; but in it he did not seem to give credit to infantry for firing quickly enough. He calculated the amount of weight of metal which infantry would fire within a certain time, the infantry occupying a certain frontage. He calculated that a man would fire about one and a half rounds a minute. Infantry can very comfortably, without hurrying themselves the least bit, fire  $3\frac{1}{2}$  to 4 rounds a minute.

CAPTAIN PILCHER.—With regard to what Lieut.-Colonel Rainsford-Hannay has said about the experiments at Lydd the 200 infantry could have fired the 2200 rounds comfortably in  $2\frac{1}{2}$  to 3 minutes instead of taking an hour over it, and this would make a difference in his mathematical conclusion.

As to what has been said about concentrating fire, first on one battery and then on another, this is a subject I have spoken about often in Germany, and the argument they use is that human nature must be taken into consideration, and that the instinct of men is to fire back at those who are firing at them. It is of course easy in peace to say you are not going to do this, but in war it is very different. Human nature is a thing you cannot legislate for, to attempt the impossible is to court defeat, besides which, to follow the course above indicated unless you are very superior in numbers or are much favored by the shape of the ground, would be to allow part of the enemy's force to fire at you under peace conditions.

THE CHAIRMAN.—I think, gentlemen, you will all agree with me that we have listened to a most interesting lecture and discussion; and although the discussion has travelled over a wide ground and has embraced many topics, I do not intend to refer to all of them. But there are two or three which seem to me to be interesting, some of which have not been noticed. And first and foremost I should like to refer to the point the lecturer began with, which I believe is really almost of the greatest importance, and that is the question of the knowledge of ground. It is one of the greatest drawbacks to military training that we have in England, probably, because of the great difficulty with which our manœuvres are carried on, and of the very great difficulty we have in getting any sort of available ground on which we can properly conduct the manœuvres, that we have not, I think, sufficiently paid attention to the enormous importance of the study of ground. I do not mean in relation to the large pieces of ground, or the question of fields and valleys, but the question of undulation; and in that very question of undulation is to be found I believe the answer to the question that was asked as to how we should best attack artillery. I believe there is hardly any position that the artillery could take up that could not be approached almost with impunity, by a comparatively small force sufficient at any rate to very seriously damage the artillery when they got near them, if there was not some corps or some scouts a considerable distance from the artillery watching it, and I am sure any officer who has studied the extraordinary effects of ground and has stooped and paid attention to the varied formation and characteristics of the surface will some day make his mark when he puts the result of his study into practice.

And then with regard to that point that the lecturer mentioned about the insistence of the Germans that the commanding officers should separate themselves from their command, that is the old question of where the officer commanding the horse artillery should be, when the horse artillery are acting with cavalry; and I know very well that many officers think that he should be always with the battery, but it has been decided now the other way. At any rate the advantage of his being away from the battery is that he has much more power and much more time to select his ground for the artillery than he would otherwise have; and exactly the same remark holds good with officers holding commands of regiments. I have never seen a battalion commander far enough, in my opinion, in front of his battalion when manœuvring. I hope when we do get more ground, or more facili-

ties for holding manœuvres, it will be one of the first lessons we shall try to teach that the commanding officer should separate himself from the details and duties of command and take general charge of his unit.

Then the question of the advance-guard battery has been mooted. But surely that must be a question of what your advance-guard has got to do; and the composition of the advance-guard must entirely depend upon the duties it is called upon to perform. The general argument would be that, as a rule, with a small force you ought to keep your artillery behind the advance-guards. As for machine guns, for my part I think in this theatre, at all events, we may leave that subject by saying that I do not think the artillery arm of the service has anything to fear from any great advance made by the machine guns.

The question of the value that is to be obtained from infantry and artillery fire I think again must be left to the discretion of those upon whom the duties fall.

Then the lecturer has made a great point of the Germans and their high explosive. I certainly thought that they had not got a high explosive for their field-gun. As far as our experiments have gone the advantage that is gained by putting high explosives into a shell of small calibre is so very small and the danger on account of the fuses and so forth is so great that up to this time we have not dared to undertake it; and I believe myself that the Germans are in exactly the same state.

## ON MORAL INFLUENCES IN WAR.

BY LIEUT-COLONEL P. NEVILLE, 14TH BENGAL LANCERS.

*(Lecture delivered at the United Service Institution of India, on the 14th July, 1896.)*

THE conditions which tend to decide the fate of armies in the field are ever exposed to the over-rule of the factor "unforeseen," which we are used to call "chance" or good or bad luck, as the case may be.

What seems to be the veriest accident will oftentimes frustrate the most ably-laid schemes of the greatest general, as was the case at La Rothiere in 1813, when the interception of a dispatch led to the defeat of Napoleon by the Allies. Again a little thing—a sudden change in the weather, the rising of a river, a heavy fall of snow, a thick fog, may cause the scale of victory to turn in favor of the side against which appeared to weigh the certainty of defeat.

If, however, we eliminate this important factor, we may conveniently classify the remaining influences which bear on the result of military operations under two main heads—the physical or material, and the moral. Physical influences will readily be understood even by those unacquainted with the art of war. These are such things as—disparity in numbers—in-equality of armament—plenty or scarcity of food and clothing—good or bad ammunition supply—the nature of the ground an army must pass over with regard to the obstacles to be surmounted—the state of the weather, which



materially affects the comfort and consequently the fighting spirit of the troops, and many other things of a like nature. But what my non-military hearers will find more difficult to apprehend is the fact that in warfare there are moral influences, unseen, unheard, acting in silence and obscurity on the individual minds and spirits of the soldiery, which in the aggregate are more powerful for good or evil than any of the physical factors I have mentioned. Some of these have enabled armies to contend against and overcome great difficulties and dangers, while others have caused panic and disaster in the ranks of those who apparently had every advantage in their favor.

Each material advantage or the reverse, carries with it a corresponding moral influence favorable or otherwise: on the other hand, purely abstract moral elements are none the less powerful for good or evil. Take for example the presence of some great leader in whom the soldiers have implicit confidence. In the early years of this century the presence of Napoleon on a battle-field was said to be equal to an army corps of 20,000 men, so great was the confidence with which he inspired his troops, and terror caused throughout Europe by his numerous and splendid victories.

Of all the moral influences bearing on warfare perhaps none is greater than religious frenzy or fanaticism. Those who have seen a charge of Ghazis will know what I mean. These men, believing that death at the hands of infidels (as they term all who differ with them in creed) opens to them the gates of the 7th Heaven—a heaven of exquisite materialism—intoxicate themselves with some drug, and then with flashing eyes and frenzied yells of *Allah, Allah!* rush on to certain destruction with a fury that has about it something diabolical. There are no more difficult adversaries to deal with than those, like the Ghazis, who court death.

During the Cábul campaign of 1879 an incident occurred which will serve to illustrate religious frenzy.

On the 12th of December a force under General Baker was employed in clearing the enemy off the Takht-i-Suleiman heights which dominate the city of Cábul. About half way up there was a plateau in front of the 92d Highlanders. When the regiment reached this comparatively easy bit of ground after their stiff climb, they instinctively pulled up to take breath. Suddenly, with a wild yell, several hundred Ghazis leaped over a line of stone breastwork behind which they had been hiding, and charged the Highlanders. The moment was a critical one. The men were out of breath and exhausted by climbing. The enemy rushing down the slope on them with the force of a torrent seemed as if they must sweep them over the precipice.

For a moment the Highlanders wavered. Then Captain Dick Cunyngham stood forth and called on them to remember some famous battle borne on their colors; the effect was magical; the Highlanders sprang forward as one man, meeting charge with charge, and the result was that not a single Ghazi survived to tell the tale.

For this Dick Cunyngham received a well-earned Victoria Cross. Now here we have no less than five moral influences exemplified in this one incident.

1. *Surprise*.—There is something in the suddenness of an unexpected catastrophe which seems for a moment to paralyze the mental and physical powers, and to render men temporarily helpless. This we shall presently consider.

2. *Religious Frenzy*.

3. The influence of the example of one brave and cool-headed man on wavering troops.

4. *Esprit-de-Corps*.—To which the leader appealed, and not in vain, and—

5. The vigorous forward impulse which counter-offense always gives to troops who have suffered a check or reverse. This is frequently far more effective than the assumption of the initiative, because in the actual fight men's blood is hotter and their nervous tension greater than at the commencement of hostilities.

Like the Ghazis, are the Egyptian Dervishes with whom our troops may have to engage before long. They display the same reckless bravery, have the same powerful physique, but are better armed than the Cábulis and have, perhaps, more skill in the use of their weapons, and it is important that we should know how to meet such attacks and with what we may overcome the demoralization naturally caused by the furious onslaughts of fanaticism.

Let us look for the weak joint in this armor—and this is easily found. A man under the influence of frenzy or intoxication is powerful only for attack. The very impulses which drive him forward tend to destroy in him the capability for defense. He will hack and thrust, but he cannot parry: he will brave every danger, but he is incapable of utilizing the great principle of union which makes all military force. What then must we oppose to these human avalanches?

Should we, like Cunyngham's Highlanders, meet charge with charge and attack with attack? I think not. In this case he had the advantage of numbers; in Egypt it will not be so, and for men like these in search of death, no attack will have any terrors. We should rather I think make use of just those qualities in which our adversaries will be deficient, coolness, presence of mind—cohesion—quick and steady shooting.

A calm defensive rôle should be our aim. Let us meet their charge as the rock meets the fury of the wave, inflexible, unflinching,—taking every advantage of our superior armament, our superior discipline, and the moral strength of union conveyed in the good old phrase “shoulder to shoulder.”

The next influence I shall mention is surprise. This has always been a powerful factor in war, and is one which we should strive to utilize to the utmost, while carefully guarding against its employment by our foes.

As we have seen, the result of surprise on troops is a sort of moral and physical paralysis, and it will depend at critical moments on the quality of the troops themselves, and the mental balance and readiness of resource of their leaders, if this does not at times degenerate into a panic and flight.

Many wonderful feats of arms have been achieved by means of this moral influence. Let me here give you one or two examples.

In the Peninsula in 1809, by means of a surprise, Sir Arthur Wellesley drove Soult out of Oporto and eventually out of Portugal.

Soult with 20,000 men had captured Oporto. Fearing little from the English, and contenting himself with observing the movements of their fleet, he gave all his attention to the civil administration of the conquered district; and so well did he succeed in conciliating the Portuguese that they offered him the crown. Soult seems to have taken kindly to this idea of a kingdom, but all his officers did not, and the result was a plot to arrest him and carry him back to France. This conspiracy was widespread in the French ranks, and greatly weakened Soult's authority. His orders were either badly executed or entirely neglected, and this probably accounts for the want of military precaution and vigilance displayed by the French on this occasion, for Soult himself was a master of the art of war.

Just a fortnight after the capture of Oporto Sir Arthur Wellesley arrived on the scene with an English force and occupied the suburb of Villa Nova, opposite the town on the left bank of the Douro, while Beresford with his Portuguese Legion crossed higher up the river at Lamego so as to intercept the French retreat in the direction of Salamanca. Soult was in Oporto, on the right bank. He had destroyed all the bridges and taken over with him all the boats, and had crowned the rocky heights above the city with 200 guns. Immediately on his arrival, Wellesley proceeded to reconnoitre from the top of Mount Serra, behind which his troops were massed. He noticed that the French had very few outposts above the town, and also that just opposite him on the other bank was a half-finished building surrounded by a walled enclosure large enough to contain 3 or 4 regiments.

This building was known as the New Seminary, and here the French had allowed to remain a number of large barges used for carrying timber and stone. Sir Arthur at once conceived the idea of a surprise, and the "factor unforeseen," to which I have alluded, favored him on this occasion, for a poor barber, anxious to rejoin his family on the left bank, managed to elude the somewhat slack vigilance of the French patrols, and crossed in a small boat. This Wellesley seized, and in it he sent over an officer and one or two men who detached and brought back three barges. In these a battalion of infantry crossed and took up their position in the enclosure, from whence the other boats were rapidly sent over, so that in an hour and a half there were 3 regiments in the middle of the French position. In the meanwhile the whole of Wellesley's artillery was got into position on Mount Serra, and General Murray with a German brigade and the 14th Dragoons, moving up the left bank found a ford by which they crossed and moved down on the French flank.

The surprise was complete, and the English captured the town. To the credit of the French be it said that they quickly recovered themselves and fought well and bravely, retiring in good order, but none the less were they driven out of Oporto by an inferior force, and after a series of disastrous marches across the mountains, to accomplish which Soult had to destroy all his artillery, they recrossed the frontier and took refuge in Spain.

This is a curious example, and instructive as illustrating the power of surprise, for these soldiers of Soult's were old and hardened warriors who had served in many a campaign under Napoleon, and considered themselves invincible. It was owing to the admirable qualities of both officers and

men that the retreat to Amorante was conducted in such good order.

Another famous surprise occurred in the Russian campaign of 1812. You will remember that in the month of June that memorable year the "Grande Armée," 325,000 strong with nearly 1000 guns, was assembled on the banks of the Neimen.

To oppose this invasion the Russians had two armies in the field, while a third under Tormasoff was hastening back from Turkey, which country through the intervention of British diplomacy, had just concluded a peace with the Czar.

Napoleon's plan was to push forward towards Moscow with all speed so as to prevent the junction of the Russian 1st and 2d armies. In this, owing to the incapacity of his brother Jerome, he was unsuccessful, and on the 3d of August, Barclay de Tolly and Prince Bagration joined hands at Smolensko.

On the Russian right Wittgenstein was in command of a corps 30,000 strong against whom Marshal Oudinot was advancing with the 2d Corps, about 44,000 men. On the 30th and 31st of July there was hard fighting at Kliastitsoui, but without any decisive result. On the evening of the 31st Oudinot rather unnecessarily retired behind the river Drissa, which he had crossed in the morning, and bivouacked in a wood. There was but one ford over the Drissa, the banks of which are very steep and 15 or 20 feet high. At night-fall General Koulnieff, commanding the Russian advance guard of 8 battalions and 14 guns, very imprudently crossed over and bivouacked on the left bank within striking distance of 40,000 French.

The wood in the form of an arc embraced the ford, the river forming the chord, and on the two extremities of the arc the trees came down to the river bank, so that the Russians could not possibly have chosen a worse position. Their crossing was reported by the French videttes to General Legrand who was in command of the nearest troops, and he immediately formed a plan of surprise.

To this end he placed a regiment of cavalry under cover of the wood opposite the ford, and a regiment of infantry on either extremity of the arc—that is to say on either flank of the Russians—also under cover.

When all were in position, the signal for advance was given, and the cavalry moved forward very quietly at a walk. The Russians had no cavalry, and their few sentries were too close to their bivouac to be of much use in giving an alarm, so that Legrand hoped to be able to effectually surprise and capture them with little or no loss. Here however, as so often happens, the general's plan was frustrated by an unforeseen occurrence. A couple of Cossacks prowling about on their ponies in search of plunder, came on the French cavalry, and immediately fled at full speed to give the alarm. The French seeing they were discovered, at once charged, but before they could reach the Russian batteries, the guns had opened on them with case, at point-blank range, and 2 officers, 37 men, and 40 horses, were killed, but before the gunners could reload the Chasseurs were among them, sabring men and horses and throwing the Russian camp into the greatest disorder.

The French infantry on both flanks now charged with the bayonet which



decided the contest. Koulnieff was killed; 4000 men laid down their arms, and 2000 were either killed or wounded.

I have already said that directly well-disciplined troops have recovered from the first effects of a surprise, this is the psychological moment most favorable for counter-offence.

A remarkable instance of this occurred at Polotsk, about a fortnight after the affair of the ford of Sivotschina which I have just related.

On the 16th of August, Wittgenstein, who had been reinforced, and now had 60,000 men, advanced against Oudinot, who had also been reinforced by St. Cyr with the 6th Corps, making his total up to 52,000.

After a hard day's fighting, the advantage if anything remained with the Russians, though the French still retained possession of the town of Polotsk.

Wittgenstein had proved himself more than a match for Oudinot, who, however, was wounded in the evening and handed over command to St. Cyr.

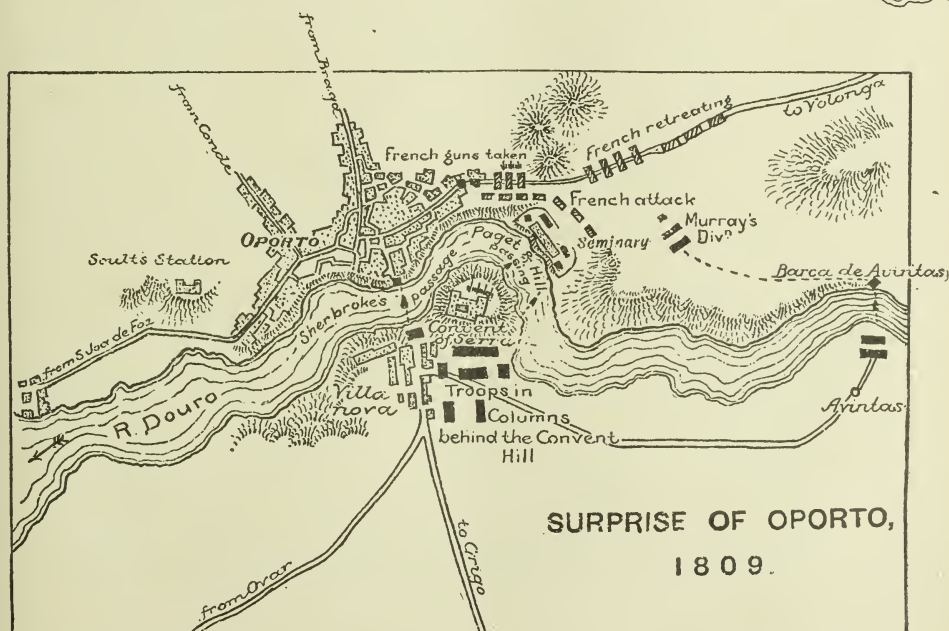
This was unfortunate for the Russians, for St. Cyr was one of the most capable commanders in Europe at that time.

Expecting to be vigorously attacked in the morning, the French general spent the night in making preparations. He cleared the streets of the town, put the wounded into billets, and with empty casks and planks constructed a second bridge over the Dwina.

The morning came, but the Russians made no move. The Poles were friendly to the French and would have helped them openly had they dared. One of them got into the Russian camp and returned with the news that Wittgenstein was expecting large reinforcements.

St. Cyr now determined to attack before these could arrive, and planned a surprise. As his troops had suffered severely the day before, he fixed the hour of 6 P. M. for the action so that darkness might put a stop to the fight before it could become too serious. The greatest quiet was ordered along the line of outposts and in the town. No troops were to show till the signal gun. The cavalry was massed behind a faubourg on the left of Polotsk where they had in front a vast plain. The infantry was told off—two divisions to attack the Russian camp—one division to support the cavalry, and two divisions to guard the town and form the reserve. The artillery was placed under cover of the dilapidated earthworks which surrounded the town, so as to command the enemy's camp. At 6 o'clock the signal was given and the whole of the French artillery fired a general salvo. Immediately the leading divisions sprang forward and carried the gardens of the faubourg with a rush, pursuing the Russians into the midst of their camp where they captured some guns and numerous prisoners. This surprise, though made in broad daylight was so complete that Wittgenstein was surrounded when seated at dinner in a little chateau near his camp. Jumping out of a back window he managed to effect his escape on a Cossack pony.

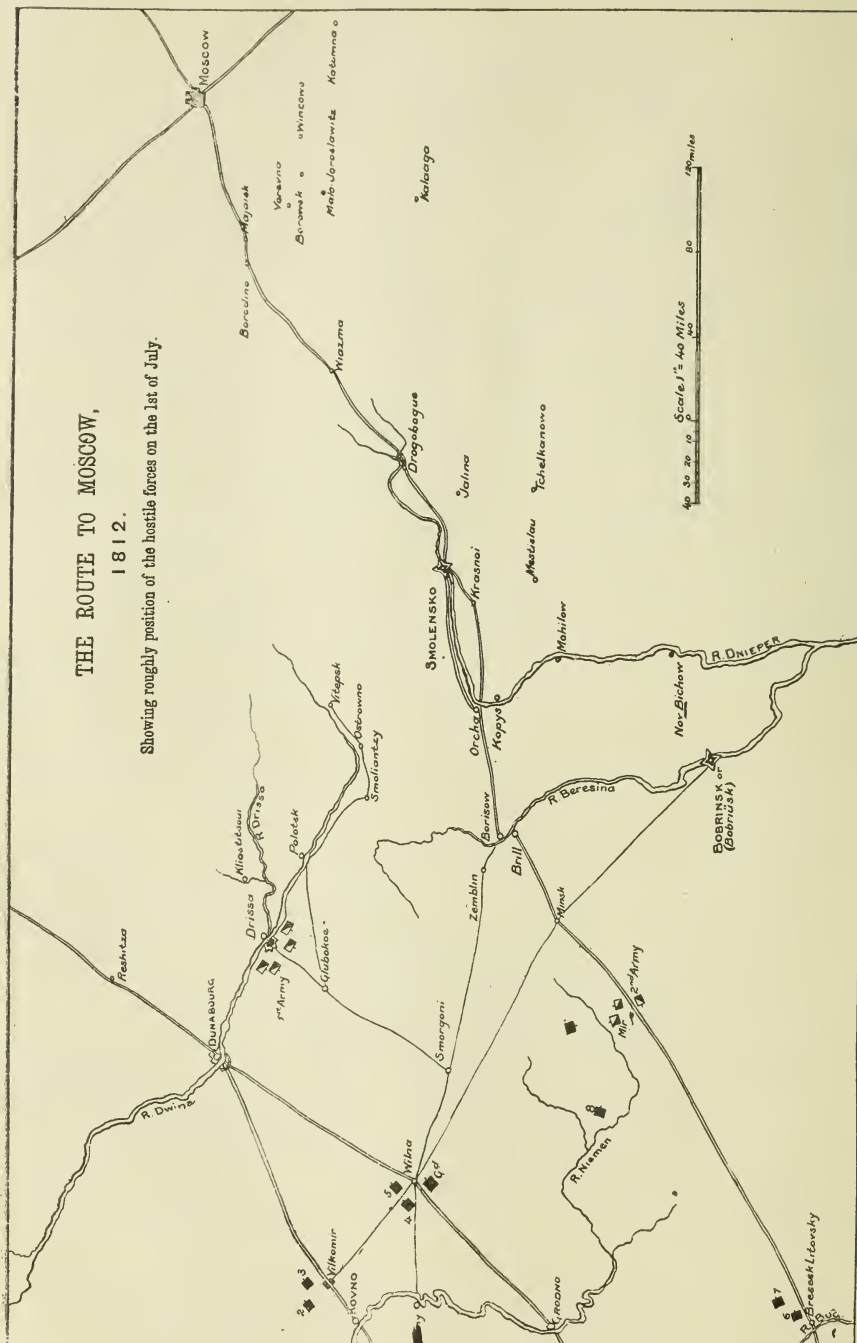
The Russians, panic-stricken, fled in all directions without attempting to take up their arms; the confusion was indescribable. But just at this juncture there occurred one of those inexplicable accidents of war, so common and yet so extraordinary, that they seem to be supernatural, and we



## THE ROUTE TO MOSCOW,

1812.

Showing roughly position of the hostile forces on the 1st of July.

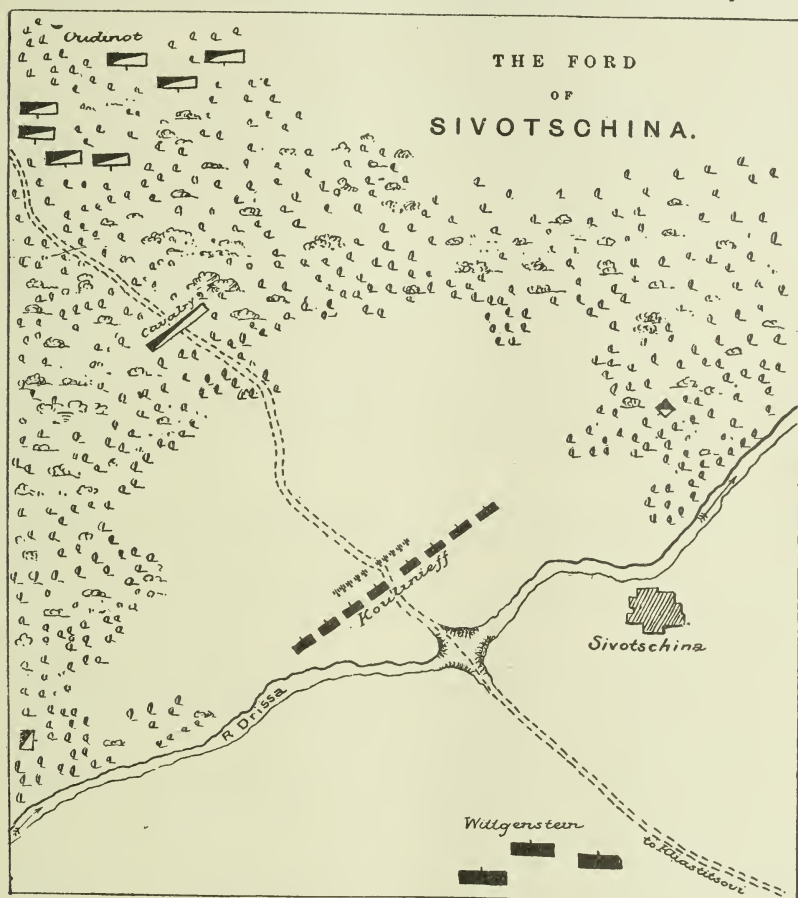


can easily understand the ancients ascribing them to the personal intervention of the gods.

In rear of the Russian camp was bivouacked a single squadron of Horse Guards—a *corps d'élite* composed of young men of the best Russian families, all noble, and commanded by a major of distinguished courage.

These, being the pick of the troops, first recovered their mental balance, and were now in the happiest disposition for counter-offense.

The gallant major, mounting his 120 Cuirassiers, set off at full speed in



the direction of the French army. The first troops they attacked were the 26th Light Infantry, who easily repulsed this attack by a single squadron. Without giving them time to rally, the major, calling on his men to follow, set off at a gallop in the direction of Polotsk, and after him in loose order all that remained of the squadron. The plain across which they rode was covered with foot soldiers—Portuguese, Swiss, and Bavarians, the allies of the French. Some scattered by the effects of their victory, were trying to rally; others were carrying off the booty captured in the Russian camp; all



were in more or less disorder. The Russian Horse Guards having knocked over a few of these stragglers,—suddenly the whole mass was seized with one of those extraordinary and unaccountable panics which now and then occur in warfare. The confusion and flight became general. St. Cyr, who had taken refuge in the midst of the Swiss battalion, was bowled over, horse and all by the flying mass and had a narrow escape of his life. It is impossible to say what might not have been the result of this stampede had it not been for the prompt action of General Berckheim, who placing himself at the head of the 4th Cuirassiers, charged the Russians and killed or captured them all. Their gallant major was killed.

In this episode we have good examples of the moral influences of surprise and counter-offense. The Russians, wearied by their hard fight the day before and seeing no movement in the French camp till evening were lulled into a false repose: they were all resting or eating. Then came the sudden attack and complete demoralization of the Russians. Now, a handful of enterprising young nobles recover and assume the offensive. They attack French troops, in formation and fail; then, violating every rule of war, and intent only on giving their own side time to rally, they fly at the throat of a whole army corps, and (wonderful to relate) put the whole army corps to flight. This is a proof of what can be achieved by a handful of resolute cavalry acting suddenly and vigorously at the right moment.

Had the Russians been less demoralized; had they followed up this first success and launched their cavalry and infantry in the wake of this adventurous squadron, the result might well have been a crushing defeat for the French at Polotsk.

Surprise will always continue to be one of the most potent moral influences in war, and the qualities required to meet it are coolness, presence of mind and, at first, a vigorous defensive. The moment the troops recover from their first surprise they will be in the happiest disposition for counter-offense, and the moral impulse given by counter-offense is ever a powerful aid to victory.

We now come to one of the greatest of moral forces in a military sense—that of discipline. It is this that gives the trained soldier such an advantage over raw levies or untrained volunteers, though individually they may be equally brave and skilful in the use of arms.

To tell you what discipline has achieved in the annals of war would take more time than many lectures of the limits of this.

You that are soldiers know what discipline is. Its essence is implicit obedience, and intelligent subordination of will to the direction of those higher in authority; its strength lies in an unbroken chain of responsibility; its moral power is the quietness and confidence with which it inspires the soldier. Discipline is the very life-breath of armed masses. Without it we have but a crowd of men, food for powder; with it we have a highly organized and powerful machine, to whose capabilities there is practically no limit.

I can do no better here than quote for you some remarks made by Colonel (now Brigadier-General) Young at the conclusion of the last lecture I had the honor of delivering in this place.

"This multiplication of power (he says, speaking of discipline), for it is nothing else, is only obtained, like all other things worth having, by much thought and constant practice, and I do not think that at present it gets either one or the other, at all events in the way necessary. The power of discipline does not merely mean a power to keep men from running away when they would otherwise do so; it means much more than this, viz., a power to keep men from advancing when and where they are inclined, or from firing when and where they are inclined, and so on, which all requires a much higher power over them than one which merely keeps them from running away.

"It is in fact the power, when their whole natural inclination impels them to do a certain thing or go in a certain direction, to cause them to do just the reverse; to halt or turn aside when they are wild to rush onwards; or to remain silent under a withering fire without firing a shot in reply. \* \* \* The man has got to acquire a habit, one which is strange to every feeling of all his previous existence, a habit of absolute, unquestioning, instant subordination of his will to the perhaps apparently erroneous will of another."

Again, Major V. Hoenig, in his "*Tactics of the Future*," speaking of what he terms the psychological element, says: "The factors which formerly animated the general himself—emulation, ambition, the desire for honor and glory, enthusiasm for the cause of the war, etc., must nowadays extend to all ranks, indeed permeate the whole machine, so to speak; and this moral factor must be fostered by an iron discipline—a discipline of the ancient Romans or Frederick the Great, otherwise the best rules and regulations are useless."

An excellent example of what discipline can accomplish is afforded by Napoleon's passage of the Landgrafenberg on the night of the 13th of October, 1806.

The French army was at Jena, which is dominated by a very steep rocky height, called the Landgrafenberg. The Prussian and Saxon armies were on the plain beyond. They believed that the only route by which Napoleon could reach them was the Weimar road, which passes through the Mühlthal, a long and difficult defile which they had strongly guarded.

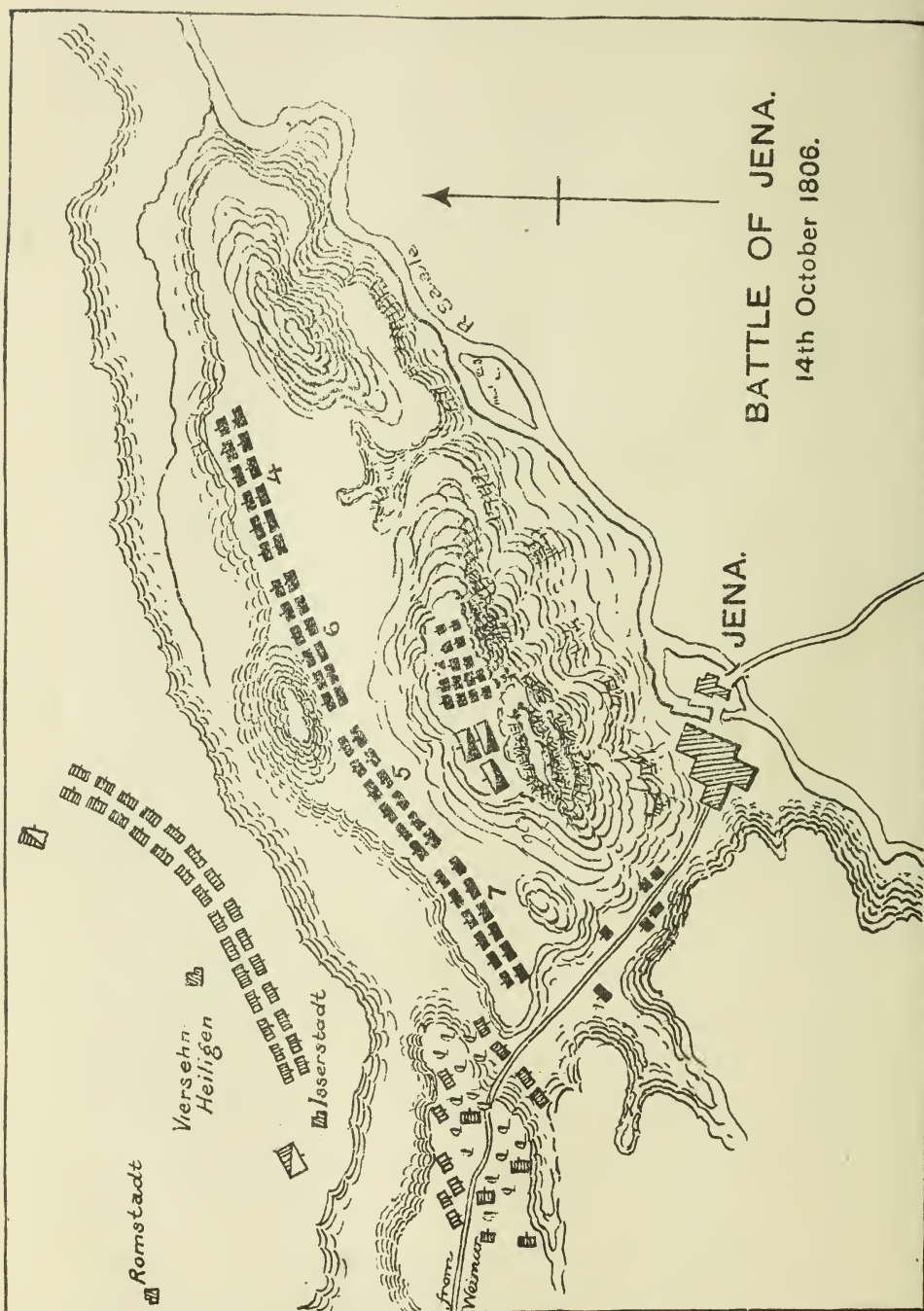
The Elector of Saxony had been compelled by the King of Prussia to join him in arms, but the Prussians were detested by the Saxon people, and so it was that, exasperated by the flames which were devouring the town, a Saxon priest offered to show the Emperor a way over the Landgrafenberg.

This he did, a narrow pathway, but from the top the great captain noticed that half way down the other side there was a sort of rocky plateau or ledge capable of holding a considerable body of troops if closely packed, and this he determined to use as a citadel, from which in the morning to attack the Prussians.

Ordering up four thousand pioneer tools from his engineering park, he set his troops to work—one battalion at a time for an hour—to enlarge and improve the road.

Each battalion, on being relieved, was to move on in the dark in perfect silence and take up its position on the plateau.

The work was carried on all night by the light of torches which were



unnoticed by the enemy owing to the flames of the burning town, and so it happened that by day-break there were 40 000 men massed on the Landgrafenberg. So closely were they packed that the chest of every soldier touched the back of the man in front of him, and so perfect was their discipline that the men stood, each in his place, all night without sleep or rest, and without the slightest sound, for all this was carried on within half cannon range—about 600 yards—of the Prussian camp. At day-break, under cover of a favorable fog, they were able to debouch from the ledge and form in order of battle on the plain beyond without the knowledge of the enemy. The result was a well-deserved victory for the French.

Next to discipline, I would put *esprit de corps* as a moral factor of inestimable value. The greatest of all leaders, Napoleon, knew the worth of this spirit, and how to foster it in his army where it attained to the highest perfection. Teach the soldier that he belongs to the finest regiment in the world, and impress on him that his particular company or squadron should be the best and most distinguished for valor and good behavior in the regiment, and that he himself should be the most distinguished man in his company, and such teaching cannot fail to have a good effect.

To this end it is that badges and buttons, facings and trappings, are ordained—to give them a pride in their uniform, and in my humble judgment it is a serious mistake to take away from a regiment anything in which the men have taken a pride in the past, be this their time-honored numbers, their buttons, their facings—what you will.

All these things help to foster the spirit of the corps, and this is a spirit that has performed many a miracle on the battle-field. In describing an attack by his regiment, the 23d Chasseurs, on the Russian infantry at Kliastitsoui in 1812, Baron Marbot says: "This charge was executed with all the more resolution and vigor because, in addition to their habitual courage, my men were stimulated in the highest degree by the thought that their comrades of the 24th were looking on." That was *esprit de corps*, and the result of that charge was the complete rout of the Russians.

I have mentioned confidence in their leaders as a powerful moral influence with troops. This of course to a great extent will depend on the qualities of the leaders themselves. Great generals like Charles the XIIth, Frederick the Great, Napoleon, or Wellington have inspired their soldiers with unbounded confidence.

In the affair of the Landgrafenberg it was not only discipline, but implicit confidence in Napoleon which enabled the French troops to accomplish their wonderful achievement, and a tale is told of his marvellous influence—an incident which occurred during the battle of Essling, which is worthy of repetition.

On the first day of Essling, the Austrians had captured the village of that name and the French regiment that had formed the garrison were driven out before a very superior force and their colonel killed.

This was reported to Napoleon, who seeing the importance of the position and having no reinforcements at hand, galloped himself up to the battalion which was reforming outside the hamlet under a hail of bullets, and demanded—"Where is your colonel?" "He has just been killed," was the



reply. "I did not ask," said the Emperor, "If he were alive but where he was." Then a timid voice explained that his body had been left in the village. "What, soldiers," cried Napoleon, "you have abandoned your colonel to the enemy! Know that a brave regiment should always be able to show its colors and its colonel, dead or alive. You have left yours in the village: go and fetch him here!" The regiment with a great cry of *Vive l'Empereur!* charged and recaptured Essling, which they held for the rest of the day.

Such was the magic influence which the presence of, and a few words from Napoleon always exercised on his troops, nerving them to face the greatest dangers and accomplish the most difficult tasks.

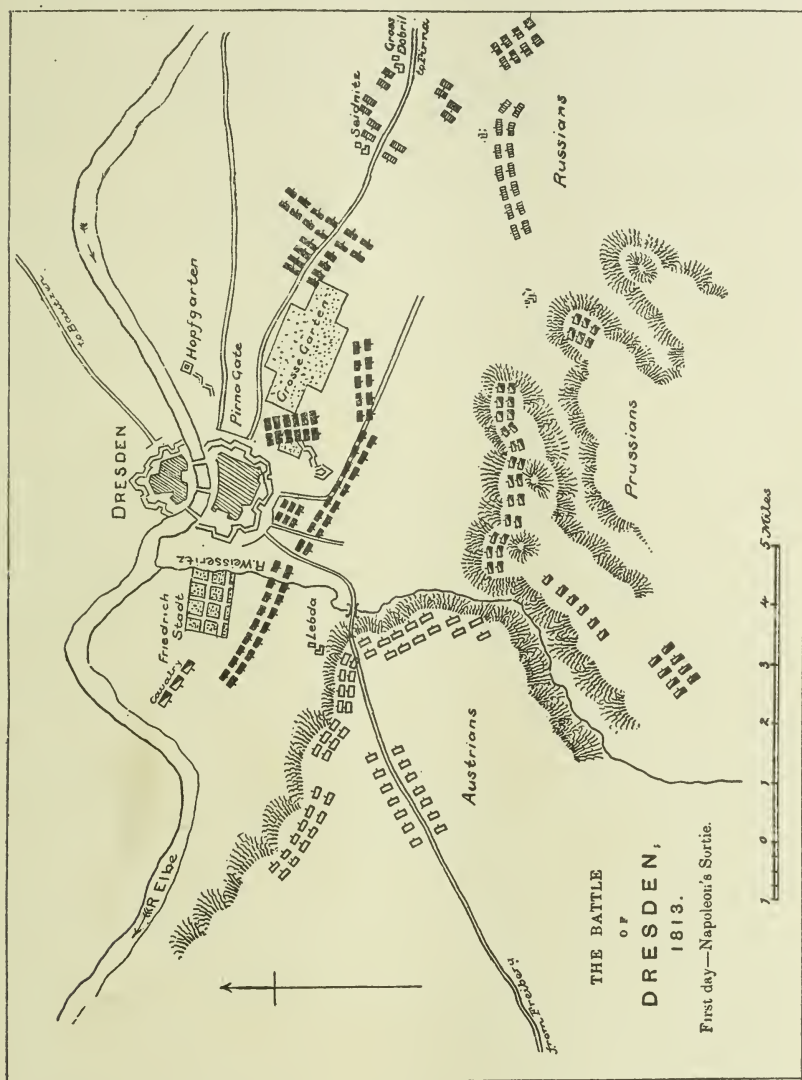
On the other hand, great leaders have inspired their enemies with fear and terror, and this moral influence has oftentimes turned the scale of victory.

When Junot in 1807 made his audacious raid on Lisbon with only 4000 men, so great was the terror which the victories of Napoleon had spread over the continent of Europe, that although Lisbon had a garrison of 15,000 men and that a powerful English fleet lay in the mouth of the Tagus, the Portuguese government hastened to accede to all the demands of the Emperor, and actually offered to declare war against England in the hope of arresting Junot's invasion. And when this had no effect, on his nearer approach, the Regent, the Queen, the royal family, all the nobles and some 10,000 of the inhabitants set sail for Brazil and abandoned their country. Junot actually entered Lisbon at the head of barely 1500 men.

But these were cowardly Portuguese—you may say. Well, one more instance; the battle of Dresden, 1813.

In August that year Marshal St. Cyr, the same whom we saw fighting against Wittgenstein at Polotsk, was shut up in Dresden with 17,000 men. Against him was marching an allied army of Austrians, Prussians, and Russians 200,000 strong under Prince Schwartzberg. On the 23d Napoleon was at Lowenberg, a small town half way between Bautzen and Breslau. Here he had news of St. Cyr's danger, and leaving Macdonald in command, the Emperor himself with the whole of the Guard, a corps of cavalry and another of infantry, set out the same afternoon by forced marches for Dresden. The distance was 90 miles and yet this large force was in Dresden on the afternoon of the 26th, a wonderful march and most fortunate, for Napoleon arrived in the capital just before the advanced troops of Prince Schwartzberg appeared on the other side of the town. Thinking they had only St. Cyr to deal with, and seeing that the defenses of Dresden were of the weakest, the Allies advanced to the assault with such impetuosity that they carried all before them, taking several out-works and occupying the faubourg of Pirna. They had reached the walls of the town and were battering at the Freyberg gate, when suddenly, by command of the Emperor, the gate was thrown wide open, and there, issuing at the "double" appeared a column of the infantry of the Imperial Guard. The effect was magical. The Imperial Guard meant Napoleon, and Napoleon meant the Devil! At the first sight of the bear-skin caps the assailants turned and fled in wild confusion, abandoning the whole of their artillery and the redoubts they had just taken.

From four other gates a similar sortie was made by the Guard simultaneously and the Allies were completely routed, losing that evening some 8000 men. The battle raged for two days, but I have not time to describe it. The second day the Allies lost 40,000 men of whom 20,000 were made



prisoners, but this episode of the Guard at the gate illustrates the moral power—the terror of Napoleon's name.

Superiority of armament is a physical or material influence in war, carrying with it a corresponding moral influence, favorable to the side possessed of it and detrimental to their adversaries. In the war of 1866 the

superiority of the needle-gun affected morally and materially the result of the campaign.

But I must warn you that certain factors in warfare have been accredited with undue weight by the unthinking crowd, and this is one of them. It does not always follow that the best armed side will win, and it behooves the military student to discriminate between the true and fictitious value of any such factors. Take for example, the case of sword *versus* lance.

A regiment of Hussars opposed to one of Lancers, might well feel they had little chance of success, and that of a certainty the whole of their front rank must be impaled on the formidable arm opposed to them before they could arrive within striking distance with the sword.

But there are many instances in military history to prove that the lance is not always victorious, and also that once the shock has taken place, the swordsmen have considerable advantage which increases in proportion to the length of their adversaries' lances.

Officers of light cavalry would do well to rehearse such contests to their men, as this would to great extent tend to discount the pernicious moral effect of the fear of the lance, which if allowed to exercise its full force might cause them to shirk the shock of combat.

Here is one such instance out of many.

You remember the battle of Polotsk, and how a single squadron of horse-guards caused a panic and flight in the ranks of the victorious French, and how General St. Cyr was overthrown by the flying masses. Well, St. Cyr was picked up by Berckheim's Cuirassiers and re-mounted. He promptly ordered up his two reserve divisions and vigorously attacked the Russians before they had recovered from their confusion, and defeated them.

While this was going on, the cavalry on both sides had become engaged on the Russian right.

The French had moved out into the plain with two regiments in first line, three in the second, and one in reserve. General Castex led with the 23d and 24th Chasseurs.

The Russian first line was also composed of two regiments, of which opposed to the 23d were the Cossacks of the Guard. This was a *corps d'élite*, and was considered the finest regiment in the Russian army.

They were dressed in scarlet, all picked men of great stature and were armed with lances 14 feet long.

They were, moreover, splendidly mounted, and as they had only just arrived and had not been engaged, their horses were fresh and in good condition. On the "charge" sounding the 23d with unflinching valor charged knee to knee against the Cossacks. The shock was tremendous, but once it had occurred all the advantage of weapons was with the swordsmen, who almost destroyed the Russian regiment and captured a number of excellent horses. In this encounter the 23d had only 8 or 9 men killed and thirty wounded.

The assumption of the initiative has always carried with it a certain moral feeling of confidence and enthusiasm which pervades the attacking side. But it must not be accepted as an invariable rule that to attack first is always advisable.

In war there are no fixed rules, and only a few fixed axioms.

When opposed to Asiatic enemies, the prompt initiative has always proved the winning move—witness the campaigns of Clive and Wellington in India—the capture of Arcot, the battle of Assaye—but where our forces are greatly outnumbered and the enemy is European, it will frequently be prudent to sacrifice this moral advantage for a greater tactical one—that of grasping the enemy's plan of attack and thereupon devising a counter-scheme which may enable us to overthrow him. Under certain circumstances the initiative is imperative and must be promptly seized or all is lost.

An example of this occurred in 1813 when two hostile advanced guards met in the defile of Glenhausen.

Napoleon was making one of his rapid marches, his objective being Hasenau.

His advanced guard, composed of cavalry unsupported, was engaged in the long defile of Glenhausen, a rock-hewn road bordering the Kinzig river. Here there was scarcely room in the widest part for 12 horses abreast. In this narrow defile they were met by Ott's regiment of Austrian Hussars.

The French commander promptly took the initiative and charged, throwing the leading Austrian sections in confusion on those in the rear. The Austrians turned and fired, pursued by the French. The pursuit lasted an hour and Ott lost 200 men, while not a single Frenchman was even wounded.

Artillery fire has always exercised a strong moral influence against troops exposed to it, while giving confidence and a forward impulse to its own side. The moral effect of artillery is estimated to be greater than its actual material value, and this is especially the case with horse artillery in a cavalry action.

The best way to overcome the natural demoralization consequent on artillery fire seems to me to be to familiarize the troops with those instances in military history where foreign armies have endured the most terrible cannonade without flinching—as the French at Essling or Wagram, and then how our own troops have stood against their fire, as at Talavera or Waterloo. Such tales cannot fail to stir in the hearts of our soldiery a spirit of emulation and a desire to imitate in their turn the fortitude displayed by their fathers.

A curious example of the moral effect of artillery is to be found in the history of the battle of Dresden. On the second day of the battle it poured torrents of rain, and towards evening a division of Cuirassiers under General Bourdesoulle drew up before a strong division of Austrian infantry in square.

Bourdesoulle summoned the Austrians to surrender, as their flint-locks being soaked with rain, they were unable to fire a shot. The Austrian general demurred, observing that as the French horses were up to their hocks in mud, and could not move out of a walk, he was more than a match for them with the bayonet.

"I will destroy you with my artillery," said the Frenchman. "You



haven't got any," replied the Austrian—"they are all stuck in the mud." "If I show you guns behind my leading regiment, will you surrender?" demanded Bourdesoulle. "Certainly," replied the other—"if you can." The French general then advanced with no little difficulty a battery of six guns to within 30 paces of the square, and the Austrian division laid down their arms.

An instance of the moral support afforded infantry by the enterprise of their own artillery will be found in the study of the battle of Königgrätz in 1866. The 57th Prussian regiment was advancing against the wood of Britz, strongly held by the Austrians. Their advance was slow and might at one time have come to a halt under the withering fire of the defenders, when Captain Schmeltzer, commanding a battery in the rear, mounting his detachments on the carriages and limbers, galloped through the skirmishers and unlimbered within 400 paces of the enemy's position. His loud word of command, "Action front; at 400 paces, with case, load!" was heard as far back as the second line, and the enthusiasm of the troops was raised to the highest pitch, so that with a rush they carried the position.

The moral effect of attacks by cavalry on infantry has always been greater than their actual physical value.

Infantry armed with modern weapons, if they are cool and unflurried, have little to fear from cavalry; but occasions will occur when they are broken and disordered, as after an assault, or when their ammunition is spent, or when they are tired and worn-out by marching, fighting, and fasting, when infantry will still be a prey to enterprising cavalry, so that its moral effect is still potent, though not perhaps to the extent it was in the wars of Napoleon. In the fierce battle between the French and Russians at the passage of the Beresina during the retreat from Moscow, the 7th French Cuirassiers charged a Russian infantry column, cut it in two, and took 2000 prisoners. Such an incident is not likely to occur to-day. At Mars-la-Tour six Prussian squadrons charged the French artillery in action, rode through the batteries and then rode over a line of infantry, but their loss was exceedingly heavy, and the more so as the survivors after the charge were overwhelmed by the French cavalry. Roughly the losses of the Prussians in this charge were 64 per cent. of the officers and 83 per cent. of the rank and file. But if cavalry attacks in front were, and are still demoralizing to infantry, much greater is their effect when delivered on the flanks or in rear; and against their own arm, cavalry has always endeavored to assail these points.

There is a common saying, that in cavalry actions one man in rear is equal to ten in front. The great difficulty, however, has always been that bodies of cavalry attempting to gain the flanks and rear of an enemy in so doing expose their own flank and rear. It is for this reason that flank attacks by large bodies of cavalry have seldom succeeded against a well-led foe.

An example of the failure of a flank attack delivered under the most favorable conditions, will be found in Marbot's description of the cavalry action at the Katzbach in 1813.

Excelmans' division had passed over the Katzbach, and was moving

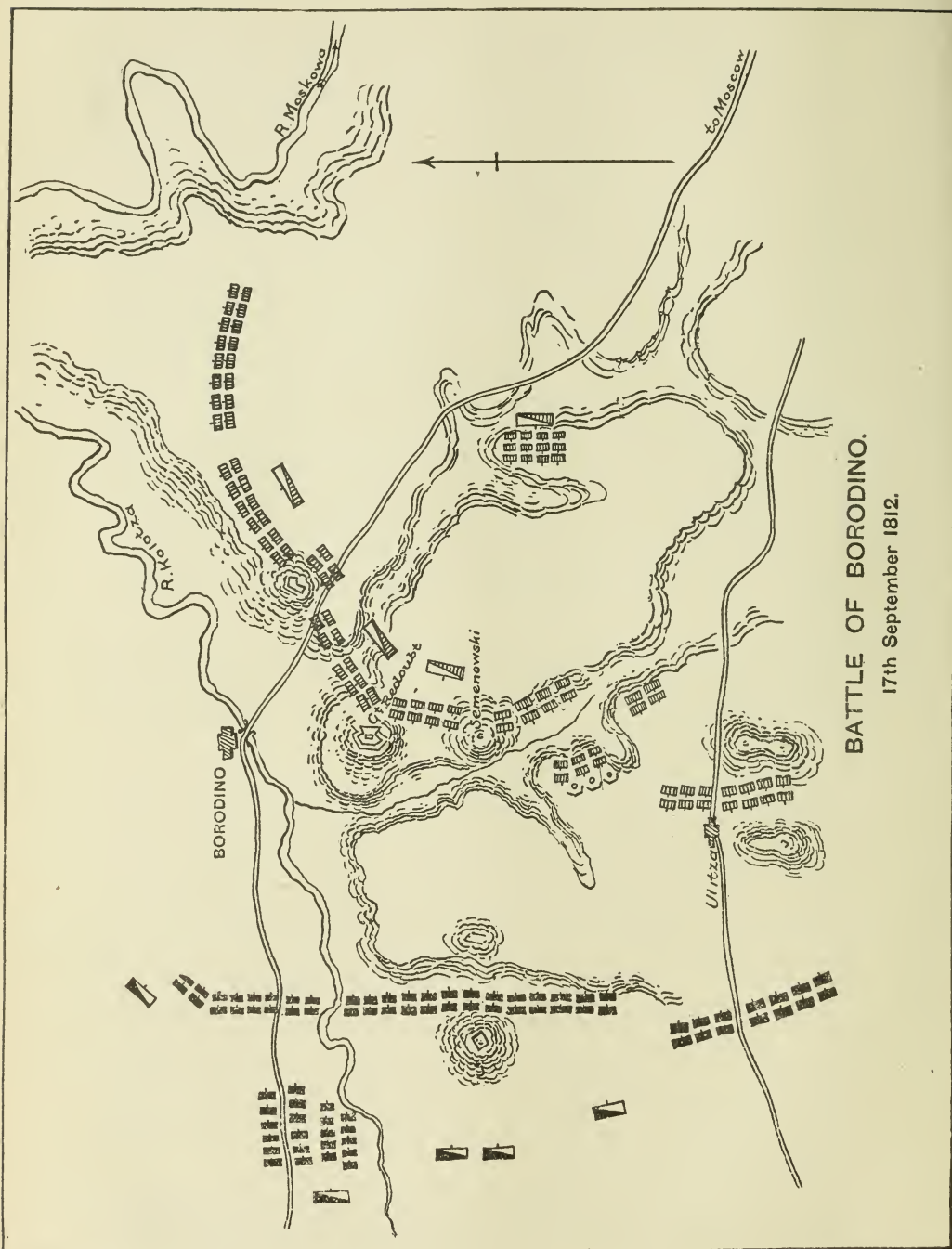
across the vast plateau of Jauer, in line of brigade columns at 500 paces interval. There was no enemy in sight, but on the French right, about 1000 paces distant there was a thick wood. Excelmans had left his command and had galloped back to inquire why Marshal Sebastiani had taken away his horse artillery, about which he was very angry, and had left his troops without orders and without any scouts out. In those days scouts were only sent out by order of the divisional general, and though Colonel Marbot had a strong suspicion that the wood was occupied, he did not dare to explore it without orders. The right brigade column consisted of the 23d and 24th Chasseurs and the 11th Hussars in this order. Suddenly, out of the wood on the right rear of the French, issued three regiments of Prussian Lancers in line, who with loud hurrahs charged the French column in flank. The 11th and 24th, taken by surprise, were thrown into great disorder, but Marbot with his habitual coolness ordered line to the right at a gallop—a difficult manœuvre in those days of pivots, and this was so well and quickly executed that they were in time to meet the enemy in good order. Moreover, the Prussians coming up from the right rear, exposed their left flank, and on this the 23d caught them and rolled them up. The 11th Hussars, a Dutch regiment, ran away, but the 24th quickly rallying came to Marbot's assistance and completely routed the Prussian Lancers. Here with every element of success in their favor the flank attack failed, they exposed their own flank and were defeated. Of course this is only an episode in the battle of the Katzbach in which the French were badly beaten.

Cavalry attacks in rear are the most demoralizing of all. A curious and unique instance of this occurred during the battle of Borodino in 1812.

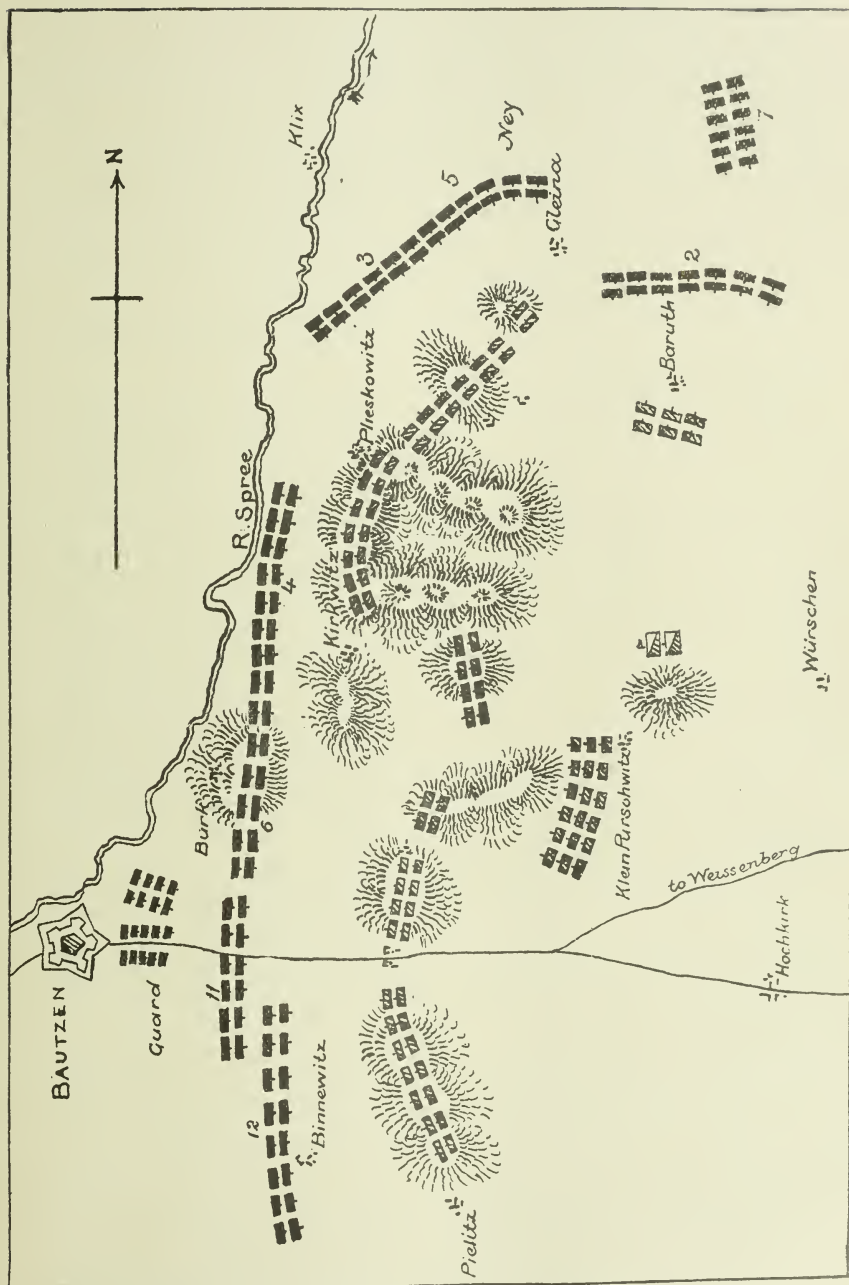
The Russian position was along a line of heights strengthened by field works—redoubts and redans, the strongest of which was a fort armed with 80 guns and known as the "Great Redoubt."

All these works were carried by the French, but the Russian Guard recaptured the Great Redoubt. General Montbrun observing that the redoubt had an open gorge and that the line of heights could be turned in flank, proposed to the Emperor to attack it in rear with his cavalry division, while the 4th Corps, assisted by the fire of 200 guns, assaulted it in front. Napoleon approved of this daring scheme, but while giving instructions to his brigadiers, Montbrun was killed by a round shot. The Emperor now appointed General Caulaincourt to succeed Montbrun, and he, turning the position, overthrew the Russian cavalry and attacked the redoubt in rear with his Cuirassiers, penetrating into the interior where he fell shot through the head. The Russians paralyzed by this unexpected attack in rear, fell an easy prey to the French cavalry, although they were several battalions strong with a numerous artillery force, and the Cuirassiers, by way of avenging the fall of their leader, killed the greater part of them and remained in possession of the fort, a feat of arms that decided the day in favor of the French.

The moral effect of attacks in flank or rear applies equally to infantry, but in a somewhat lesser degree, as the more rapid evolutions of cavalry bring the additional moral influence of surprise to aid that of the indirect



BATTLE OF BORODINO.  
17th September 1812.





attack. What I have said, too, about the difficulties attending such attacks, also applies.

On the 30th of July, 1812, Wittgenstein drew his army off the route to St. Petersburg in order to fall on the left flank and rear of Oudinot's corps at Kliastitsoui, and in so doing exposed his own right flank to the French attack, and moreover laid open his line of communications. The French were victorious that day, and if Oudinot had been possessed of more dash and less of that ultra caution which marred his fame as a general, if he had only pushed boldly on that night, he might have cut off the Russian line of retreat, and St. Cyr coming up with the 6th Corps, and Macdonald, who had just taken Dunabourg, closing in on their rear, they would have been surrounded and would probably have surrendered.

A glance at the map of the battle of Bautzen, which is a good example of a successful flank attack, will make plain what this exposure of the attacking army's flank means.

Napoleon at Bautzen had nearly twice as many men as the Allies, and could spare 60,000 for the flank attack under Ney, while opposing an equal number to the enemy in front. The allied Russian and Prussian army was in a strong entrenched position, and the battle lasted two days. On the evening of the first day the French turning movement was clearly seen by Barclay de Tolly from the heights above Gleina, and had he been a better general, he might easily have devised some counter scheme to oppose it. Had he, for instance, during the night retired the whole of the Guard to Wurschen, and then taken a northerly direction for five or six miles, by daybreak he would have had 24,000 men on Ney's flank while Kleist held them in front at Bayruth. Moreover, of the Guard, 8000 were heavy cavalry which would have been of the greatest value, as Napoleon had no cavalry on this occasion. As it was, it proved a dearly-bought victory for the French, for it cost them 25,000 men, while the Allies' loss was but 15,000. Moreover the Allies, covered by their cavalry, retired in good order by Hochkirk and Weissenberg, so that beyond forcing them to retreat the French really got the worst of the engagement.

Flank attacks, therefore, are not really so formidable as they seem: good generalship should usually enable us to defeat them.

Hitherto the fear of being outflanked has, I think, unduly weighed with military leaders, and has been allowed to exercise a spurious moral influence which a closer study of the annals of war would do much to discount in value.

But what is the practical lesson to be learnt from the whole subject?—for that, after all, is what concerns us most. I think it is this—that certain moral influences in war are so powerful for good or evil, that in our military training they should by no means be neglected, or lost sight of. Of these, some are only to be mastered in times of peace—on the parade ground, in the lecture room, on the range. Such are discipline, which, as we have seen, is a slowly acquired habit formed by constant practise, and *esprit de corps*, about which I shall have a few more words to say. The first of these in our army is not what it ought to be if we are to hold our own against all comers. We have sensibly deteriorated in our discipline since

the days of Wellington. A long peace (save for minor wars) of forty years has, I fear, caused us to lose sight of the incalculable importance of this great moral force. What must we do then? It is not for me to say. Reforms must come from above—from the very highest authority. There is, however, one suggestion that I would venture to throw out, and that is, that it seems to me advisable in the interests of discipline to take away from general officers commanding divisions and districts in this country the power of mitigating the sentence of a court-martial. I am convinced that if this were done, and this power vested only in the Commander-in-chief for general courts-martial, and lieutenant-generals commanding army corps for all others, it would be a step in the right direction. At present there is too much mitigation, and this is to the detriment of discipline, if it does not directly encourage crime. It must be clearly borne in mind that there are two kinds of discipline. One is the slavish discipline of fear, the discipline of the circus horse or the performing dog. This has been found necessary in the past when great numbers of ignorant and boorish conscripts had to be drilled and made into a fighting machine. It was no use appealing to their intelligence—they had none—so fear was made the master force.

Very terrible were the punishments of Frederick the Great, and in 1812 even this baser sort of discipline had wonderful results in the Russian ranks; but what we require is a far higher moral standard, a discipline of intelligence and knowledge. Each soldier in our ranks should be taught that he, individually, has an important part to play and that it is by his prompt and implicit obedience to orders that the whole war machine is to be brought to the highest pitch of perfection. There is no discipline without punishment, but the praise of well doing should be a far greater incentive to the good soldier, than slavish terror to the bad.

The second of these influences, *esprit de corps*, we seem rather to discourage in our army than otherwise, and, believe me, this is a great mistake. Discipline steels men for defense and teaches them to follow their leaders into danger, but it is *esprit de corps* that gives us volunteers for the forlorn hope,—deeds of heroism, good conduct, sobriety, good shooting, proficiency in military exercises.

So great a factor do I deem this moral influence on the well-being and efficiency of an army, that I would put it no whit behind discipline itself. I would bracket these two together—discipline and *esprit de corps*.

When has the world ever seen soldiers more valiant than those veterans of Napoleon's—the heroes of Austerlitz—Jena—Friedland—and Essling? And what was the moral influence which nerved them to the accomplishment of deeds over which we are wondering still to-day? Patriotism?—Love of fame and glory?—Personal devotion to their Emperor?—Discipline? No; it was none of these, though doubtless each had its moral value in degree,—it was *esprit de corps*. Napoleon recognized the vital importance of this spirit and knew how to foster it. He knew the value of badges and buttons, bits of ribbon, pompons on shakos, Eagles and regimental colors—in short, all the invaluable trifles which we to-day in our short-sightedness have thrown away.\* His soldiers were, by his orders, so

carefully instructed in the history and annals of their own regiments, that not a man but could tell the name of every colonel since the battalion was raised—of every action it had ever taken part in—of every *sous officier* promoted on the field. We would do well, I am persuaded, if we, as a military nation, devoted our best attention to the revival of this great moral force in the ranks of our army, and to this end in every regiment and every garrison selected officers should be detailed to lecture to the troops. By means of illustrations with the lime-light, maps, etc., these lectures might be made as attractive to the men as theatricals or concerts, and would be of the greatest value in fanning the dying embers of the military spirit that once pervaded England.

Our regiments should be made familiar with their history. They should be taught to emulate the brave deeds of those who have passed away from their ranks, but whose fame and glory still shed a halo round the colors of the corps. The anniversaries of great victories should be religiously kept as military holidays, and no effort should be wanting on the part of our officers to stimulate this most important moral element.

The other influences we have considered belong more essentially to the province of the battle-field, and much may be learned by practice during peace manœuvres.

Let me give you one example. We have seen the moral value of surprise, and of attacks in rear. These, taken together, are specially applicable to cavalry combats, because in infantry fights the movements of the troops must of necessity be slow, and unless under exceptional circumstances, like those of Austerlitz, it will always be difficult for them to surprise a vigilant enemy or take them in rear.

But with cavalry it is not so. They should aim at surprises at all times, and never neglect an opportunity for attacks on the rear of their adversaries. Such attacks will be most effective when delivered immediately after the shock of the opposing lines, and to carry them out special bodies of troops should be provided. Take, for example, the case of a brigade of three regiments in the attacking line. Instead of the old fashioned and useless "succor squadrons" in rear, let us have three "surprise squadrons" following in rear of the flanks of the centre regiment and on the exposed flank.

On the "gallop" sounding, let the brigade advance in double echelon of regiments at half distance. When 150 yards from the enemy's line, the centre regiment charges, and a few seconds later the two refused regiments likewise charge, the independent squadron, however, making no alteration in their pace. On the final shock, the brigade will still remain in a double echelon, and this is the favorable moment for an attack on the enemy's rear. This will be carried out by the "surprise squadrons," each field troop acting independently and falling on the rear of a hostile squadron.

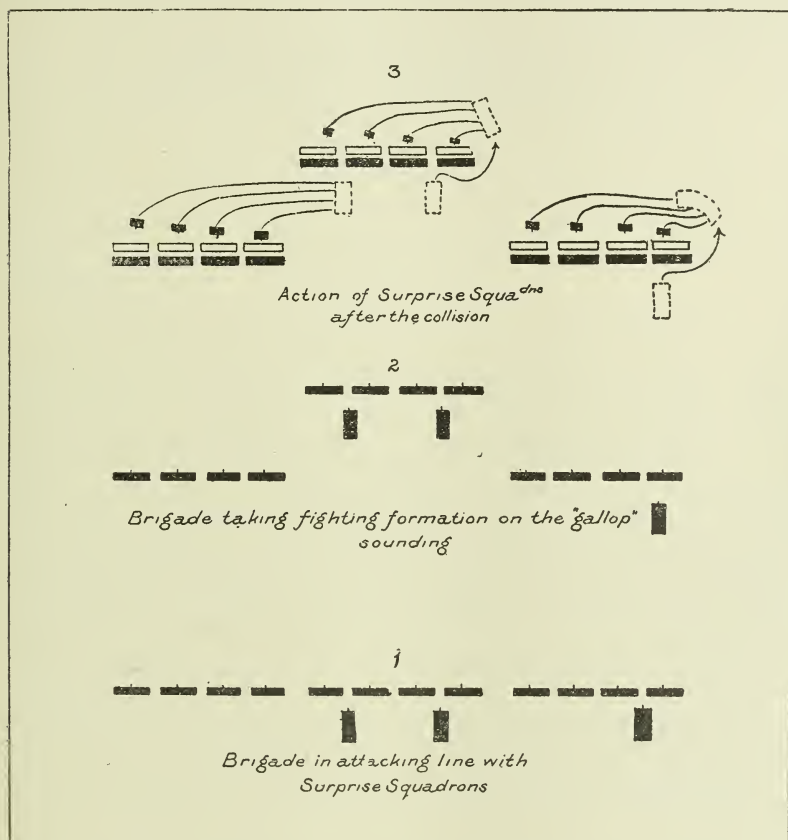
This is one example out of many I could give you of how we might practice the utilization of moral influences at peace manœuvres, and thereby accustom ourselves to make them serve our ends in war.

In conclusion, while striving to utilize to our advantage every moral element of success, we must not neglect to teach our troops rightly to esti-

mate those adverse influences which tend to demoralization and defeat, and how to defeat and overcome them.

This belongs to the province of the lecture room, a province the borders of which I should like to see greatly enlarged.

Ignorant and ill-disciplined troops are always liable to faint heartedness during a retreat, or when obliged to act on the defensive, and this demoralization is very apt to degenerate into a panic. But take the example of a skilful swordsman. He is often forced to fight on the defensive when



opposed to an adversary of equal skill who attacks vigorously; but is he dismayed?—has he any idea of seeking safety in flight? Never!—and why?—because he is a master of his art. The fact of his having met his equal and perhaps superior in fence, only makes him more cool, more wary, more self-possessed.

Exercising all his skill and cunning, he wards off every attack, ever watching with an eagle eye for an opening—a chance for a sudden counter-attack. And this is how the well-trained soldier ought to fight: not with blind fury, or sullen obstinacy, but with an intelligent appreciation of the



difficulties and dangers of the situation, and a firm determination to overcome them. The training necessary to this end is discipline, and discipline is not made perfect in ignorance but in knowledge.

With perfect discipline, the emulation given by true *esprit de corps* and the confidence afforded by a sense of being a perfect master of his weapons, the British soldier will fight and conquer as his fathers did in the by-gone years. We may be outnumbered but we shall not be dismayed; we may have few well-wishers and no allies amongst the great powers of Europe and yet we shall cry—

“Come the three corners of the World in arms  
And we shall shock them. Naught shall make us rue,  
If England to itself do rest but true.”

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## MR. GRIFFITH ON THE TESTING OF SMOKELESS POWDERS.

(*Arms and Explosives.*)

A HEADING such as the above cannot but arouse the interest of all who are in the slightest way concerned with the manufacture of guns or of small-arms powder. As practically the original chemist and superintendent of the pioneer smokeless powder factory of Great Britain, and we think we might say almost of the world, Mr. Griffith has an experience unequalled in the annals of this industry. In the early days of the Schultze Gunpowder Company, the difficulties which faced them appeared almost insuperable; and at the time when Mr. Griffith was engaged to take charge of the factory where Col. Schultze's products were being exploited a great deal remained to be done before smokeless powders could be considered in any way a reliable substitute for black powder. The chemical properties of smokeless powder necessitated in their manufacture a very much more detailed knowledge of the forces which have to be controlled than in the case of black powder, and the man who would have a smokeless powder in those days had first to invent the machinery and apparatus for obtaining an exact record of its various physical properties.

Mr. Griffith's early days were, therefore, occupied as much, if not more, with problems connected with the measurement of the ballistic effects of his powders as with the questions more intimately connected with the powder itself. He was, however, eminently successful; and, as his inquiries proceeded on the lines dictated by sound scientific knowledge and by a practical mind, he has originated ideas, and formulated these into theories which are now universally accepted as being at the root of the questions with which they deal. For these and other reasons, which do not require further specification, we were led to anticipate that the lecture which Mr. Griffith arranged to deliver on the occasion of the visit of the Gunmakers'

Association to the Schultze Gunpowder Factory would be in its way a record, and we can only say that our anticipations have been justified to their fullest extent.

While this account does not in any way profess to be a verbatim record of what was said, at the same time its substance is given without material deductions. Here and there certain points have been somewhat expanded, as the sense of the lecture in a measure depended upon the apparatus displayed, or on the information which had been obtained prior to the lecture by the visitors in their inspection of the works and laboratories.

The lecturer opened his remarks by referring to the gradual evolution which had brought into existence the present methods of testing the strength of modern small-arm compounds. He explained that before smokeless powders were brought forward, the system adopted was of observing the recoil of the gun and assuming that the penetration would be proportional. When smokeless powders came into general knowledge, however, the extraordinary diminution of the recoil, accompanied as it was by an equally effective flight of the charge of shot, rendered this method of comparison useless, and it became necessary to cast about for some more reliable alternative.

About the year 1870 the great point aimed at was the penetration, and it was this which all the tests of that period attempted to establish. The measurements were taken at a range of forty yards, and it was sought, by working with various forms of targets, to obtain a reliable record of this factor in the travel of the shot. Mr. Griffith explained that he had made exhaustive tests in this direction, and that among the devices employed were the following: Movable targets on wheels, paper pads, tin sheets, wax cakes, water targets, field force gauges, Pettitt's pads, copper sheets, levers and pendulum, straw boards, lead sheets and cardboards. All of these gave some information, but none proved to be reliable in all cases.

Meanwhile Mr. Griffith kept the problem of ascertaining the internal pressure of the gun fully in view, and he sought by various devices to find a practical solution of his desires. His first move in the direction of the measurement of pressure was to obtain from Birmingham a number of cheap gun-barrels. These he tested with successively increasing charges of powder until he arrived at a point where, by careful measurements, it became apparent that the capacity of the gun to resist the internal pressure had been exceeded. Having established this point, it was possible to know whether a certain batch of powder gave results within the limits of the strength of an ordinary gun-barrel. In 1878, however, the first plug gun was made, and it was produced at the lecture. It had an eight-bore barrel, and resembled nothing more closely, owing to the noble dimensions of its form, than a small cannon. The principle, however, was there. Holes were drilled into the bore of the barrel, and these were stopped up with movable plugs, which in their lowest position came flush with the surface of the bore. The pressure of the powder gases inside this gun was resisted by various means, which included such devices as dead weights which operated on the plug through the medium of levers, dead weights directly connected to the plug, and springs acting with a very high tension on the

plug. These devices were far from perfect, but, nevertheless, they gave very favorable data.

This gun was followed in the year 1886 by a lead crusher gun, which was the pioneer of the at present very successful system of plug guns and lead crushers. The plan adopted consisted of placing small cylinders of lead on to the top surface of the plugs, which were at their lower ends exposed to the action of the powder gases. A screw was brought down on to the top of the lead cylinder, and the effect of the explosion was to drive up the plug so as to cause a compression of the lead cylinder against the rigid screw which held it above. These lead crushers gave regular measurements, but the great difficulty was to translate them into pounds per square inch.

Mr. Griffith found it necessary in those days to manufacture his own lead crushers, as he found that nothing he could procure in the market was sufficiently accurate in the leading points on which correct results depended. For instance, lead crushers cannot give reliable results unless their dimensions, their weight, and their hardness are true and uniform. His *modus operandi* in their manufacture was as follows :

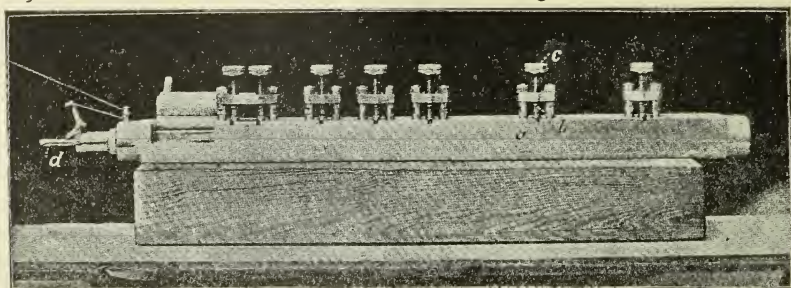


FIG. 1. COGSWELL & HARRISON'S PRESSURE GUN.

Cylinders of lead, as nearly as possible of the correct form, were placed in a press where a uniform blow was struck upon each. The ends were then carefully trued up, and if their weight then proved to be uniform, they were passed as ready for use. Since then, however, Messrs. Eley Brothers, Limited, have undertaken their manufacture, and the results have been of a most satisfactory character. The crushers made by this firm possess all the features of accuracy which the delicate nature of the experiments for which they are to be used require. There is thus no further need to continue the arduous work of manufacturing them on a small scale.

The pressure guns have, since the manufacture of Mr. Griffith's pioneer type, scored an equally satisfactory advance at the hands of Messrs. Cogswell & Harrison, and nothing better could be desired than the various pressure guns put upon the market by them. There are various types of these guns, but the most generally used is that in which there is a single plug at one inch from the breech face. There are others, however, in which a series of plugs are placed all along the barrel, thus enabling the pressure to be taken at other distances from the breech face. We illustrate one o

these guns herewith (Fig. 1), and it will be seen to consist of a square block bored internally to the required size of gun. The series of plugs are fixed at the following measurements from the breech face, viz., 1 in., 2  $\frac{1}{2}$  in., 6 in., 9 in., 12 in., 18 in., 24 in. The plug, a, is in communication with the bore of the gun, and the lead crusher, b, is shown with the binding screw, c, holding it in place. The weapon is closed by a suitable form of breech block, and the firing pin, d, is operated by a lanyard. These crushers give remarkably true results, and though there is no way of translating their results into the recognized units of pressure, for comparative purposes, they are extremely valuable. It has been the custom, however, to give equivalents for various crushings in a series of tables in tons per square inch; and although there is no theoretical justification for the actual values assigned, Mr. Griffith expressed the opinion that the table of equivalents, as issued by Messrs. Eley Brothers, went, as far as he could judge from the exhaustive experiments he has made, extremely near to the truth. He used these equivalents in all his experiments, and he was pleased to take the present opportunity of acknowledging his indebtedness to the company for them.

There was one point, however, to which he would like to call attention. It was that the duration of the pressure producing the crushings had a considerable effect on the results, and that unless account was taken of this factor, the readings might appear to be misleading. The following table gives a record of the results obtained from the above gun with various powders, in which will be seen that Schultze powder gives a pressure at one inch of 2.55 tons per square inch, as compared with a condensed powder in a coned case of 2.10 tons, while at 2  $\frac{1}{2}$  in. Schultze gives 2.62 tons and the condensed powder 2.25 tons,

TABLE OF PRESSURES IN A 12 BORE BARREL, IN TONS PER SQUARE INCH, TAKEN BY LEAD CRUSHERS.

	At from the Breech.						
	1 in.	2 $\frac{1}{2}$ in.	6 in.	9 in.	12 in.	18 in.	24 in.
Black No. 2.....	3.16	2.90	1.42	1.28	1.25	1.25	1.15
“ No. 4.....	2.60	2.40	1.45	1.28	1.25	1.25	1.20
“ No. 6.....	2.15	2.04	1.55	1.40	1.28	1.28	1.25
Schultze.....	2.55	2.62	1.48	1.30	1.25	1.25	1.20
A condensed powder in coned case	2.10	2.25	1.50	1.25	1.20	1.15	1.05
Do. in ordinary case.....	3.45	2.56	1.50	1.25	1.20	1.15	1.05

On the face of it there appears to be no explanation of this, but the following table, which is a record of the time occupied by the charge of shot in traversing the various sections of the length of the barrel, throws some light on the point. We will explain further on how the measurements are obtained; but for the time being it will be sufficient to indicate that the figures represent the number of ten-thousandths of a second taken up by the charge in travelling, first from the cartridge case to three inches up the bore; second from three inches to six inches and so on.

It will be seen from the second table that while the record of pressure o



TIME TAKEN IN TRAVEL OF SHOT IN A 12 BORE BARREL, TAKEN AT VARIOUS POINTS BY  
A SMITH CHRONOGRAPH, IN TEN-THOUSANDTHS SECOND.

	Cap to 3 in.	3 in. to 6 in.	6 in. to 12 in.	12 in. to 18 in.	18 in. to 24 in.	24 in. to 30 in.	Total time in barrel in seconds.
Black No. 2.....	72	45	55	45	35	30	0.00282
“ No. 4.....	138	52	61	50	40	34	0.00375
“ No. 6.....	162	55	65	56	45	37	0.00420
Schultze.....	275	46	57	48	40	34	0.00500
Condensed in coned case....	72	44	57	48	42	37	0.00300
Do. in ordinary case .....	100	45	58	49	42	36	0.00329

2.55 tons per square inch was obtained with Schultze powder, the pressure producing it was applied during a period of 0.0275 of a second, while with the condensed powder the recorded pressure of 2.10 tons per square inch was obtained with a duration of pressure amounting to only 0.0072 of a second. Of course, it would not be necessary to take these time results in every case, because with the same powder the above general characteristics of time are maintained with a considerable amount of uniformity, and may therefore be remembered accordingly.

While the rough and ready method of testing the violence and penetration of a gun by noting the sensation of recoil felt on the shoulder gave way, on the one hand, to pressure tests along the barrel, it was replaced, on the other, by velocity tests between the muzzle and the target, which are now about to be described. The method adopted consisted in measuring the period occupied by the shot in travelling from the muzzle of the gun to the target at 40 yards, and calculating from this the mean velocity over the distance. For this the Boulengé chronograph was used, and it was sufficiently accurate in itself, though at first there was a difficulty in taking accurate records owing to the “stringing” of the shot. The cause of this difficulty was that a number of pellets reached the target much in advance of the main body of the charge, and severing the electrical connection, gave a wrong idea as to the time of the arrival of the main body of the charge. The problem to which this gave rise was to find a means of eliminating the first arrivals, and this was satisfactorily accomplished in the year 1883 by means of what is known as the sectional target. We may mention, for the information of our readers, that a full description of one of these appeared in our June issue of last year.

The lecturer explained that it would not be necessary for him to give any long description of the method of working the Boulengé chronograph, as it had been out so many years that almost every one was already acquainted with it. The general principle of it, however, is that two weights are suspended from a pair of electromagnets, which, on a severance of electrical current, cease to be magnets and allow the weights to fall. One weight falls when a wire is cut at the muzzle of the gun, and the other falls when the charge reaches the target. When the second weight falls, it operates a knife, which, making a dent on the first falling weight, shows the distance it had travelled before the other began to move, and from this is deduced the time occupied, and thence the mean velocity.

The disadvantages of this apparatus, however, render it in some ways unfit for the class of work required of it in an explosive factory. In the first place, a reading can only be effected between two points of time. In the second place, the electromagnets are liable to what is known as "residuary magnetism," which is a property they have under certain conditions, to retain enough attractive power, after the circuit has been broken, to delay the fall of the iron weight attached to it. Another disadvantage is that the records of time cannot be taken with the desired amount of fineness. Furthermore, the rate of fall is dependent on the altitude of the particular place where the tests are made; in other words, the gravitational force is not of constant value at all places. Another point is, that the effect of the air resistance cannot be taken into account.

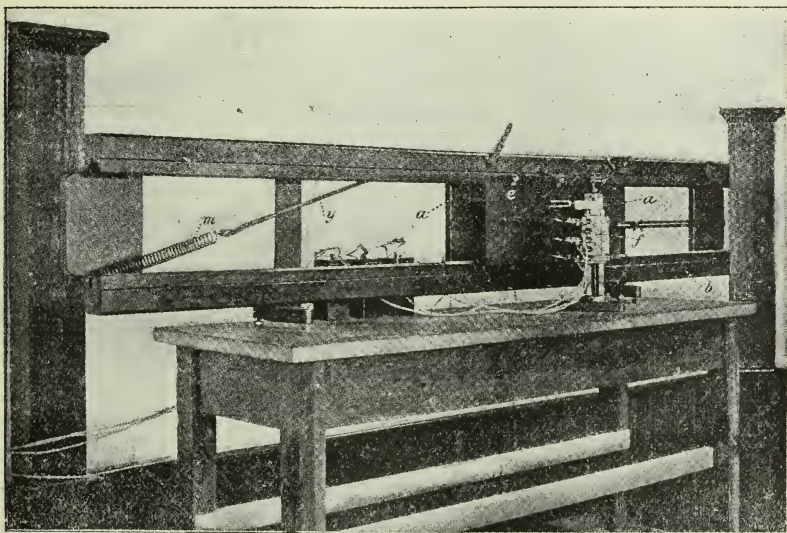


FIG. 2. PROF. SMITH'S CHRONOGRAPH.

The most important of the above objections is, however, that the periods of time are not measured to a sufficiently fine degree; because it soon became apparent, in testing the velocity at 40 yards, that a number of outside factors were introduced which might materially affect the results, but which have no bearing on the efficiency or otherwise of the explosive. Among these may be mentioned the fact that the boring of the gun materially alters the velocity that the charge of shot retains beyond, say, five yards. What was really required was a more delicate chronograph which is sufficiently sensitive to measure the velocity over the first five yards from the muzzle and which could take several records at the same time. One of the effects of measuring the velocity at five yards is that the stringing of the shot has not yet commenced to take place, and consequently any wires that may be severed at that distance are broken practically simultaneously by the whole charge.

The Smith chronograph fulfils these requirements, for it registers readily an interval of 0.0001 of a second, and may be used to take simultaneous records. An illustration of this chronograph is given herewith (Fig. 2) and it will be seen to consist of the carriage, *a*, which travels in guides from one end to the other of the frame, *b*. The carriage is forced up to the right hand end against the pressure of a spring, and when it has reached its ultimate position it is automatically locked by means of the catch, *c*. The handle, *d*, is connected with the catch holding the carriage in check. This gun is fixed, as shown in our illustration of the trial gallery (Fig. 3) and wires communicate between it and the chronograph. The muzzle of the gun is pointed to the cast-iron block, *z*, which is suspended in the air, and which has wires fixed across the hole in the centre, which are broken by

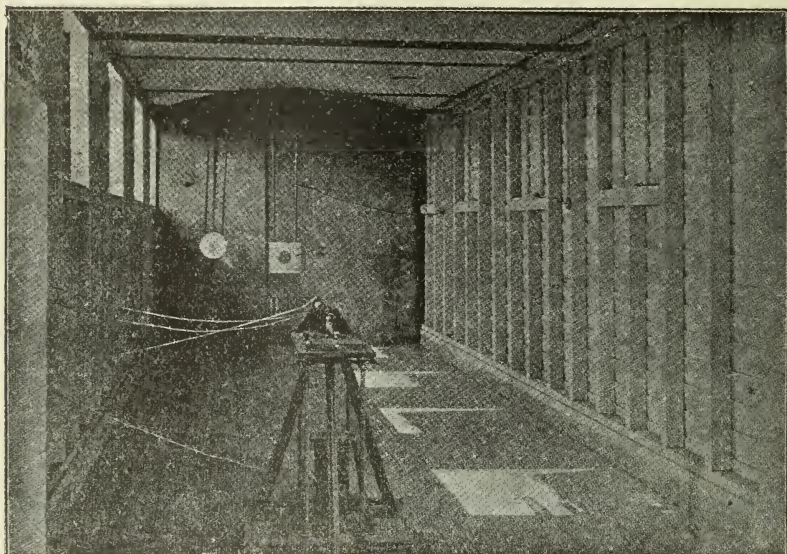


FIG. 3. TRIAL GALLERY.

the shot pellets. Returning to the chronograph, attention should next be called to the glass plate, *e*, which is fixed on the carriage. This glass plate is evenly smoked over the surface by means of a benzine lamp, and it is by the markings on this plate that the records are obtained.

The medium for producing the marks is the electrical marker, *f*, which is shown separately in Fig. 4. It consists of a tuning fork, *g*, which is adjusted so as to give the musical note which corresponds to 10,000 beats in a second, or any other that may be decided upon. The tuning-fork is provided with a scratching point, *h*, which comes into contact with the surface of the smoked plate of glass. Three other indicators, *iii*, are arranged beneath this, and they will be seen to consist of scratching points, *j*, which are actuated by electromagnets, *k*. In order to fire the gun and obtain these records of time, the tuning-fork is given a slight tap, and immediately after-



ward the handle, *d*, is pulled. The pulling of this handle serves to release the sliding carriage, *a*, of the chronograph, which in its turn discharges the gun at the proper point in its course. As the sliding carriage slides along the frame, the point, *h*, of the vibrating tuning-fork scratches a wavy line on the smoked surface of the glass plate. The recording magnates, *k*, are actuated when the charge leaves the muzzle, and when the shot has travelled five yards

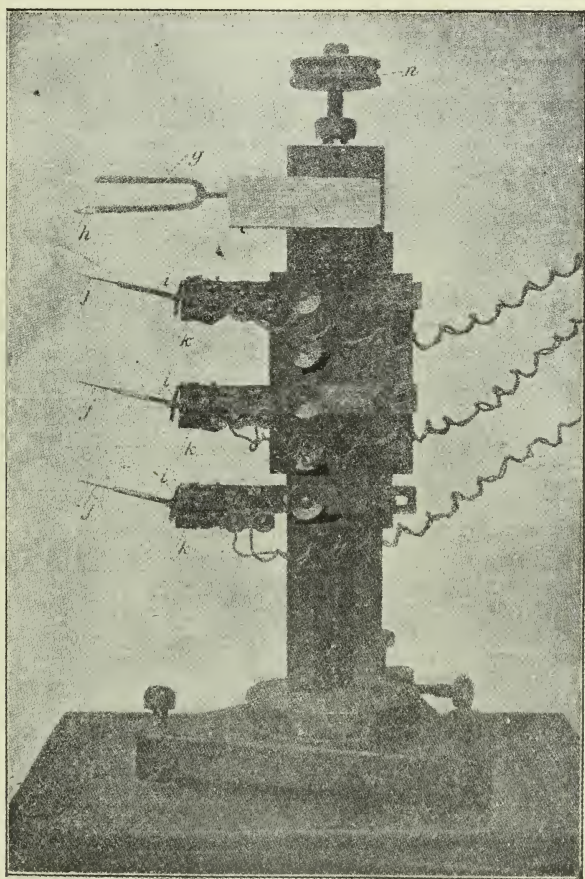


FIG. 4 MARKER FOR SMITH'S CHRONOGRAPH.

or otherwise, according to the arrangement of the connections for the particular test in progress, in the following manner: These points are mounted so that a spring is always tending to pull them upward. Some very small magnets, so small in fact as to diminish within reasonable proportions the tendency to residual magnetism, are arranged to hold the pointers in a downward position. When the electrical circuit is broken, the magnets, losing their power, allow the spring to pull the pointer upward, and the



line, which the pointer was previously scratching on the smoked surface of the glass plate, takes a sudden turn upward and then continues to describe the line in its new position. The carriage, having passed beyond the electrical marker, is brought up by coming into contact with the piece of leather, *l*, which is kept taut by the spiral spring, *m*. When a record has been obtained on the above principle, the screw, *n*, which is shown on the electrical marker, is given one turn, and this has the effect of bringing each of the scratching points a little lower down and so opposite to an unscratched portion of the smoked glass plate, and after reloading the gun, a fresh series of measurements may be made.

In order to make it clearer as to how these records are obtained, we reproduce in Fig. 5 a series of actual readings which were obtained on this

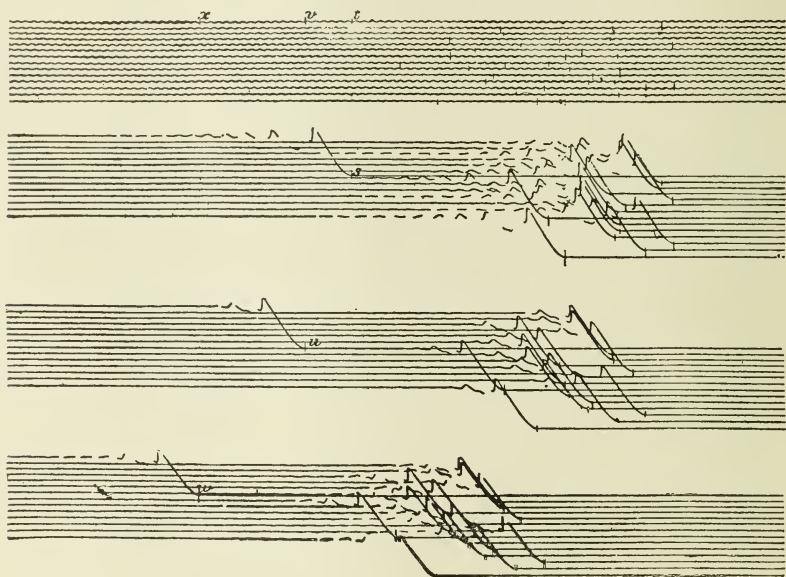


FIG. 5. ACTUAL RECORDS WITH A SMITH'S CHRONOGRAPH.

principle. It may be explained that when it is required to keep a permanent record of one of these plates, all that is necessary is to treat the smoked plate with the scratches on it as a photographic negative, and print off from it as many copies as may be required. Our illustration represents a print obtained by this means. It will be seen that the plate contains a record of no less than fourteen sets of measurements. The wavy lines of the top band of scratchings are those made by the tuning-fork, while the remaining three bands are those produced by the electrical markers. The top wavy line corresponds with the topmost scratching of each of the three bands beneath. The second wavy line corresponds to the second scratching of each of the series of lines beneath, and so forth. The top series of lines may, for the sake of an example, be taken to represent the  
nt at which the first wire was broken by the fall of the hammer; the

next series of lines may be taken to represent the time at which the charge arrived at the muzzle; and the third series of lines may be taken to represent the arrival of the shot at five yards from the muzzle. The edges of the glass are made strictly square, and all that is necessary is to mark off on the corresponding position on the line of waves a line opposite to where the electrical indicator commences to give the line an upward turn. Dealing only with the first reading, it will be seen that the mark, s, has been projected into its corresponding position, t, on the wavy line. Further, the mark, u, has been projected to the position, v, and the mark, w to x. It will be seen, that there are thirteen distinct waves between t and v, and six waves between v and x, which establishes that 0.0013 of a second were occupied by the period from the fall of the hammer to the arrival of the charge at the muzzle, and 0.0007 of a second for the charge to travel from the muzzle to the 5 yards target. Of course it will be understood that these explanations of the table are purely fanciful, as we have no record before us as to what the actual results are which were being taken on the plate before us. The above supposed measurements on our part would give a velocity of 21,000 odd feet per second, which is of course ridiculous.

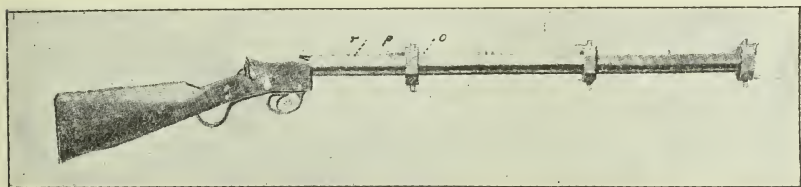


FIG. 6. PLUG GUN.

We do not even know which tuning-fork produced it, for, as a matter of fact, there are several sizes which give widely different number of beats per second according to the nature of the work in hand.

It should always be remembered that any number of marking points may be used together, all that is necessary being to increase the glass plate to a size sufficient to receive all their impressions.

An important use to which this chronograph has been put is the previously noticed measurements of the time occupied by the charge of shot in traversing the successive sections of the barrel's length, and this is done in a fairly simple manner. Instead of connecting the wires from the electrical indicators of the chronograph to the muzzle of the gun, etc., they are carried to the special gun, which we illustrate herewith (Fig. 6). It is known as the plug gun, and it will be seen to consist of a shot-gun with a Martini action. The barrel of the gun is perforated at intervals in its length at the distances indicated in the second of the tables quoted at the commencement of this article. While these holes are so small that the escape of gas through them, if left open, would not amount to a loss resulting in more than one foot per second in the muzzle velocity of the gun, they are at the same time sufficient to enable the operator to introduce into it an electrical conductor, which is broken by the charge as it passes that particular point

along the barrel. The term electrical conductor is used advisedly, because an electrical wire would not give results of sufficient accuracy; for the passage of the charge would not cause the instantaneous fracture required. The wire would be drawn out for some distance beyond the point where nominally it would be supposed to have broken. Furthermore, the drawn out ends of the wire might prevent the complete breakage of the electrical circuit, as they would be quite likely to be carried beyond the insulating plugs, in which they would have to be embedded, and thus they would maintain the continuity of the circuit by pressing against the sides of the barrel or against the charge of shot.

The way in which this difficulty has been overcome is most ingenious. As is known to most of us who have done any glass blowing, a piece of glass tube, if warmed in the centre and pulled out, may be drawn to a thread as fine as a hair, and yet with all this the minute hair still remains as perfect a tube as the original one from which it was drawn. Mercury is filled into a short length of a suitably fine tube obtained by this means, and the ends of this capillary tube (as it is known to scientists) are connected to short wires, which in turn are connected with the electrical markers on the chronograph. The required number of these glass tubes is put into the gun, and the charge may always be relied upon to produce an instant interruption of the electrical circuit established through them.

This is the way our second table was arrived at, and it is unnecessary to point out that the results are obtained from the mean of a number of shots fired presumably in two series, as the particular chronograph here illustrated is only provided with three electrical markers. The most interesting feature of the plug gun, which gives us measurements of the periods of time occupied by the shot along the barrel, is the fact that it enables us to establish a certain practical relationship between the records with lead-crushers and their so-called equivalents in tons per square inch. It is known to all, that the gravitational attraction of the earth produces a definite ratio of increase of velocity in bodies allowed to fall freely under its influence. In exactly the same way it is a simple problem in applied mechanics to produce from the velocity acquired by a charge of shot of a known weight, over a known distance, the effective mean pressure which brought this about. Thus, turning to Table I. with Schultze powder, we know that, from a state of rest, the shot reached three inches during a period of 0.0275 of a second, and from three inches to six inches there was such an increase of velocity that this distance was traversed at 0.0046 of a second. From these figures the effective pressure which produces these results can be deduced, and the pressure so calculated can be compared with the amount of crushing which the leads receive. Though such calculations can take no account of the pressure in the gun, which was neutralized by the friction of the charge of the barrel, they give extremely valuable results for comparative purposes.

In our illustration of this gun, p shows the places where holes have been made in the barrel for the reception of the capillary tubes, and o is a sleeve fixed on the holes where tests are being made, and it is used for holding the insulated terminals for the electric circuit.

In connection with the general question of measuring the velocity of shot-guns, it may be interesting to point out that the records show a gradual improvement during the past twenty years. In 1878 the acknowledged standard velocity was 845 foot seconds. In 1886 it had risen to 855 foot seconds, and now an average of 870 to 880 foot seconds can be relied upon at 40 yards with No. 6 shot. From this there appears to be every prospect of reaching a muzzle velocity of 900 foot seconds without disturbing the excellent patterns given with the lower values at present in use.

Mr. Griffith, in continuing his lecture, explained that the method in use at the Schultze factory is to test chemically for purity daily, and with the above apparatus for the internal pressure and velocity. The powder is then stored away for three months, when the tests are repeated, and the results are also taken at 40 yards simultaneously with an observation of the patterns produced. In reference to patterns, however, Mr. Griffith explained that that was a question which concerned more closely the ammunition manufacturer and the gunmaker. The powder imparts a given velocity to the shot at the muzzle and it remains with the ammunition and the gun to insure that that velocity was suitably utilized, and that the resulting patterns should be in accordance with the requirements of the sportsman.

In conclusion, the lecturer explained that though some portions of the work of a gunpowder manufacturer and tester had not yet become an exact science, at the same time when one considers the many side issues which, though not capable of independent estimation, may materially affect the results, the progress so far obtained appears extremely satisfactory from the practical point of view.

Among the different points influencing the science of ballistics may be mentioned the following: Charge of powder, charge of shot, composition and quantity of primer, flash hole, wadding, stiffness of paper tube, turn-over, boring of gun, shape of cone, choking. When all of the above are considered, it seemed to the lecturer that the powder manufacturer and the gunmaker may be congratulated on the excellence and regularity to which their various manufactures have attained.



# Military Notes.

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## THE FIRST LINE.

THE handling of the first, or containing, line presents so many difficulties and requires so much study that a discussion on the subject must always prove interesting to officers who have got beyond thinking of the attack merely as a parade movement and who are aware that exact lines, carefully measured advances, and chess-board reinforcements are not the only requisites to fit a battalion to take its place in the first line on the field of battle. It is of little consequence whether it is called the "first line" or the "containing line," although perhaps the latter is preferable if there is any advantage in a name which denotes its duties, for a containing line it certainly is. Its duty is to creep up towards the enemy's position, suffering as little as possible in doing so, and, having arrived at a position suited for its purpose, to occupy the attention of the enemy along the whole front and, without allowing itself to become involved in any effort to assault which may result in its being driven from the ground it has won, to smother the enemy's fire and thus to conceal the advance of and prepare the way for the assaulting columns. It is impossible to lay down any hard-and-fast rule as to the best position for this line to establish itself; as it depends, first, on the nature of the ground; secondly, on the amount of resistance it meets; and, thirdly, on the support it can expect. The great advantage in this line establishing itself as near to the enemy's position as possible, if it can do so without too much sacrifice, is, as the assaulting column must sustain the heaviest losses during the time it is advancing over the ground between its own containing line and the enemy's position, the shorter that distance is made the better for the assaulting column. Too great stress cannot be laid on that "if," as the fact must not be lost sight of that the expenditure of life necessary to get the first line so near the enemy's position would, in many instances, be more economically spent on the assault. The first line, unless it is aided by a ridge of hills or other cover at a convenient distance from the enemy's position, behind which it can creep up unmolested, will be compelled by nature to lie down and cover itself with fire, and it will take just the same new vigor imparted to it to carry it on a few yards as the front lines of the assaulting column will require, with this difference: the assaulting column will only be on a breadth of, say, 120 or 150 yards, while the first line will be on a breadth corresponding to the breadth of the enemy's position; therefore the expenditure required to push the containing line on thirty yards would, in all probability, be as much as that required to push the front lines of the assaulting column on several hundred yards. Also it must

be remembered that the closer the containing line to the enemy's position the less chance it will have of repelling a counter attack. The most suitable position for the first line to hold must therefore remain a question which the nature of the ground and the bullets of the enemy can alone decide, but the argument for or against a near approach should always be kept in view and carefully considered.

The next point to consider is what its duty is when it arrives at this position. The "Infantry Drill" is very clear on this point. It says the first line should "keep up the most effective fire possible" and "establish itself in a good defensive position whence both false and real attacks can be made on the position in front." It is a pity it did not add, "by the second line." Too great care cannot be taken to insure that this first line has sufficient strength, first to enable it by itself, without the help of the assaulting columns, to reach the most favorable position for it to establish itself; second, to enable it to pour an effective and well-sustained fire into the enemy's position when it gets there; and third, to enable it to arrive there with such confidence in its own strength and with sufficient support close at hand that it will stand its ground steadily against any counter attack that may be launched against it. It should be borne in mind that once the first line has established its firing line in the selected position constant reinforcements will have to be at hand, and that they are sufficient to insure the maximum number of rifles being in the firing line which can be employed. Now the first line should be taught to depend on itself to accomplish these ends. It has nowhere to look for help, the assaulting columns and the third line have their own duties to perform, and so whatever is to come to the first line must be supplied by that line itself. The amount of resistance that will probably be met must be carefully considered by the commander in order that he may place sufficient troops in his first line to insure that the duties entrusted to it are carried out, the most successful and economical commander being he who throws his last reserve into the firing line just as the enemy, his position assaulted at one or perhaps more points, begins to retire along the whole line. This can only be arrived at by economical reinforcements at the early stages of the advance.

One of the most discouraging features in all the attacks during the recent manoeuvres was the way the commanding officers, in spite of the instructions they have received on that very point, recklessly used up their resources in the early stages of the attack. Whether it was from the habits of the barrack square, or whether it was they did not look far enough ahead, the fact still remained that, as a rule, after the first line had advanced a short distance, and often before it had been seriously engaged, supports and reserves had been hurried into the firing line, and no reinforcement was left to push the line on when it was most in want of a fresh impetus.

Now as to the formation in which to bring up the first line to the desired position. It must have struck any onlooker during the recent manoeuvres that commanding officers did not grasp the difference between advancing under cover and advancing under fire, and the ordinary formation

that was adopted was an extended line, followed some 200 or 150 yards behind by a support in single rank, followed a similar distance behind again by a reserve generally in line. If the advance was being made under a galling fire, and when crossing a plain within range of the enemy's bullets, little fault could be found with such a formation, but seldom during the manœuvres was an attack made over a plain of any extent, but the extended lines were there all the same. On the last day of the Aldershot manœuvres during the conference the Quartermaster-General said: "The advance of this division on the line of intrenchments was in a faulty formation \* \* \* cover could have been found on the lower spurs of Chobham ridges and the men kept in company columns." The Commander-in-chief said: "Emphasis should be put on the remarks of the Quartermaster-General as to the proper formation for advancing over the country that presented itself, and the regular lines should have been broken up into company columns." These remarks cannot be too well understood or too carefully acted on. Now, taking for granted that the aim and object of the first line is to get to the position selected for it with as little loss as possible, and without shattering the men's nerves by useless exposure, it would appear that any formation should be adopted which would allow of an advance under cover. But another object must not be lost sight of, namely, the necessity of at any moment having to deploy into rank entire should a bullet-swept zone have to be crossed. At first it seems difficult to reconcile these two objects, and if rigid notions of drill and parade ground are to be entertained it is impossible; but with a carefully-trained set of company and section leaders these difficulties at once disappear. An extended line is a formation difficult to handle, but if there is no necessity for the extension, viz., when out of range or when under cover, the advance should be made in, say, columns of companies, half companies, or sections, as if moving to a flank covered by a few scouts. If these little columns move at double deploying interval, at any moment the columns may be extended and a line in rank entire exposed to the enemy's view, which, if cover is again obtained, can easily be drawn together and again moved in little columns. The same applies to supports and reserves, which should in the same circumstances advance in company, or half-company columns, as if moving to a flank. The necessity for good leading now makes itself felt. Frequently the formation of the ground or the necessity of clearing the front of guns in action would force these little columns either to expose themselves or to go out of their way and close in on the sections to the right or left. This can only be done by the leader of the little column himself, who should know his general line of advance, should know the directing unit, and should be fully aware of the necessity of keeping his station, to borrow a naval expression, but who at the same time should be on the alert to take every advantage of ground offered. Not the least difficult duty is that of the leader of the unit of direction, as he must not only guide his own unit, but must keep his eyes open to see what the units on his right and left are doing, so regulating the pace as to insure no unit being left behind or being unduly hustled. If leaders of these units, whatever they be—companies, half companies, or sections—were trained to carefully study ground,

and were made to understand that their duty is to pilot their command with as little loss as possible, and without losing station to such a degree as would create confusion, to its allotted position, easy will be the task of the commander, whose one object should be to get the first line to the best position at which it can fulfil its proper task, viz., prepare the way for the assaulting column. Commanding officers often exercise their battalions in the attack, but it is feared that more attention is paid to the smartness of drill than to the much more important business of training unit leaders. The commanding officer who realizes the importance of unit leading, and spares no time in instructing those leaders, will be amply repaid for his trouble if his battalion is ever called upon in war to form one of the battalions in the first line.—*The Army and Navy Gazette*.

## THE FOOD VALUE OF CHOCOLATE.

Some years ago a distinguished member of the French Institute, Jean Baptiste Joseph Dieudonné Boussingault, who in his youth served on Bolivar's Staff in South America, printed in the *Annales de Physique et du Chimie* an interesting paper on the food value of chocolate, from which we take the following extracts:

"Chocolate contains a very large proportion of nutritive matter in a small volume. In an expedition to a great distance, where it is imperatively necessary to reduce the weight of the rations, chocolate offers undeniable advantages, as I have had frequent occasions to notice. Humboldt recalls what has been said with reason, that in Africa, rice, gum and butter enable men to cross the desert; and he adds that, in the New World chocolate and corn-meal render the plateaus of the Andes, and the vast, uninhabited forests, accessible to man.

"In Central America, when they organize a river expedition, or traverse the forests, they prepare chocolate for provisions with eighty parts of cocoa to twenty of coarse sugar, the composition being as follows:

Sugar	. . . . .	200
Butter	. . . . .	410
Albumen	. . . . .	100
Phosphates and salts	. . . . .	30
Other matter.	. . . . .	260
		<hr/>
		1000

"Each man receives 60 grammes (about 2 ounces) of this chocolate per day, in which there are 12 grammes of sugar, 26 of butter, and 6 of albumen. It is a useful addition to the ration formed of beef slightly salted and dried in the air, of rice, of corn biscuit, or of cassava muffins.

"The infusion of tea, maté (Paraguay tea), and coffee are not, of course, to be considered as food. The amount of solid matter in them is very slight, and their effects are due only to their alkaloids.

"This is not true of chocolate, which is at the same time complete food and an active excitant, since it approaches in composition that model food, milk. In fact we have seen that in cocoa there is legumine and albumen, associated with fat, sugar to sustain respiratory combustion,



phosphates, which are the basis of the bones, and—what milk does not have—theobromine and a delicate aroma. Roasted, ground and mixed with sugar, cocoa becomes chocolate, the nutritive properties of which astonished the Spanish soldiers that invaded Mexico."

#### THE VICTORY OF SHOT OVER ARMOR.

The penetration of 10 inches of nickel steel, face hardened, reformed plate by a 6-inch shot on September 5 was in itself a phenomenal performance, and places the gun once more far in the lead. But when our readers learn that, after penetrating the plate, the shot passed through 12 inches of oak and three plates  $\frac{7}{8}$  inch thick, and was finally found 8 feet back in the sand and practically uninjured, they will understand how complete is the superiority of the best type of shot over the best type of armor to-day.

It is a matter of history that, just at the time when armor-plate makers were discouraged by the ease with which the gunmakers were able to penetrate the toughest nickel steel, Mr. Harvey produced his brilliant invention for giving an intensely hard face to the plate, and succeeded in smashing up the projectiles at the moment of impact. Shots which theoretically should have passed clear through a Harveyized plate failed to do so, because their points could not hold together long enough to break in through the highly tempered face, which was made so hard that it could cut glass like a diamond point.

Subsequent to the appearance of Harveyized armor the makers of projectiles have been trying to produce a shot which should combine the necessary hardness and toughness to enable it to split open the hardened face and hold together until it had wedged its way through the body of the plate itself. A few of the best makers have met with partial success. The Holtzer in Europe and the Sterling-Wheeler in this country have succeeded in breaking up the face; but the effort has proved too much for the shell, which has usually collapsed before it could get entirely through the plate. This has been the case almost invariably when the improved reformed Harvey plate has been attacked. The result is shown very clearly in the case of shot No. 1 in the recent trials, when an 8-inch Holtzer shot, weighing 250 pounds, and fired with a velocity of 1800 feet a second, entered the plate and broke up, leaving the point embedded.

For many months the reformed Harveyized plate held its superiority, and it looked as though the final victory in the long contest between shot and armor was to rest with the armor. The next move on the part of the artillerist was of a very extraordinary, but very successful kind. He placed a cap of soft steel over the point of the shot to protect it, and, paradoxical as it may appear, the soft cap enabled the shot to get through.

The part played by the cap may best be explained by a simple experiment which can easily be tried by any of our readers. An ordinary sewing needle may be driven through a copper cent piece by thrusting it through a cork until the point is flush with the bottom of the cork, placing it upon the copper cent, preferably over an anvil, and giving the head of the needle a sharp tap with a light hammer. The copper will be cleanly perforated. The surrounding cork holds the body of the needle in the line of the blow,

so that its whole force is concentrated at the point. The action of the cap is somewhat analogous. It preserves the integrity of the point of the shot at the moment of impact, holding the material together until penetration through the hard face is effected. Moreover, the cap becomes fused by the heat of concussion and lubricates the point as it enters. After the face is broken through, the Johnson shot holds together by virtue of its peculiarly hard and tough composition, which is obtained by a secret process of manufacture.

Shot No. 2 represented a 6-inch 100 pound Johnson shot which was fired with brown powder at a velocity of 2100 feet per second. It penetrated to a depth of 8 inches and communicated all of its theoretical capacity at that velocity, the rear portion of the shot breaking off and rebounding from the target. Mr. Johnson was confident that if the shot were given greater velocity, it would make a clean penetration, and accordingly a charge of 28 pounds of torpedo station smokeless powder was inserted for the next round. The shot, weighing 105.25 pounds, struck the target with a velocity of 2505 foot seconds and an energy of 4594.8 foot tons at a point 21.5 inches normally from the bottom, and 32 inches from the left edge of the plate. The work of the shot, which passed through the plate practically uninjured, can best be given in the words of the official report :

Action of projectile.—Projectile penetrated plate, backing, boiler plates, and was recovered 8 feet back in the sand, entire, with the exception of one-half of base broken off diagonally to the bandscore. The remaining portion of the shell was in excellent condition, with the point whole, the head slightly scored, increased in diameter at the bourrelet 0.15 inch and in body 0.06 inch; length decreased 0.49 inch. Two small surface longitudinal cracks in the body 5.5 inches and 2 inches long, also two in the head 1.5 inch and 2.5 inches long respectively. Four fragments recovered; total weight, 95 pounds; weight of the shell proper, 85 pounds.

Effect on Plate.—Penetration complete; diameter of shot hole,  $6\frac{1}{2}$  inches; interior for about 3.5 inches in rough, with fused metal, rest of hole smooth, all the interior being coated with copper, probably from the rifling band. Diameter of splash and flaking, 13 inches,  $\frac{5}{8}$  inch deep. The boiler plate backing was star opened to a diameter of 16 inches.

A comparison of the two cuts showing the projectile before and after firing will show the wonderful endurance of the shot. The deep scorings on the conical head were produced by the jagged edges of the hardened armor face, and the twist imparted by the rifling is plainly discernible. The corrugated recess at the base is the seating for the copper rifling band, which, as the report states, was sheared off in the shot hole, together with diagonal fragments of the base. Altogether this is by far the most brilliant performance of any shot in any country, and the two photographs which are now presented to the public for the first time are well calculated to carry dismay into the camp of the armor plate makers. Messrs. Johnson & Company, of Spuyten Duyvil, New York, are to be congratulated on a success which has come as the result of many years of costly experiment; and the country at large will be pleased to think that, if Harvey's plates have been signally beaten, it is an American projectile that has done it.

Incidentally it should be noted that the success of the second Johnson shot was only achieved by using a high velocity, considerably higher than the 2000 feet per second which is obtained with the standard brown powder used for United States ordnance. Mr. Johnson is asking for 3000 feet per second in order to develop the full potentiality of this solid shot; and it must certainly be admitted that the introduction of smokeless powder, with its higher velocities, would be an advance along the lines which are being universally followed by the gunmakers of England and the Continent. The 10-inch Brown segmental wire gun now in course of construction by the Government will have a maximum velocity with smokeless powder of 3000 feet per second, and would seem to be the natural counterpart of the Johnson shot. The *St. Louis* and the *St. Paul* are designed to carry a battery of 6-inch guns, and if these guns were to be of the wire wound pattern, and the ammunition included smokeless powder and a certain number of rounds of Johnson shot, these cruisers would have three-fourths of the armor plate now afloat at their mercy.—*Scientific American*, December 5.

#### FRENCH QUICK-FIRING FIELD-GUNS.

One of the points which occupied the attention of Li Hung Chang, during his recent tour through Europe, was the progress made by different nations in the development of quick-firing field-guns. It is said that he was, at St. Chamond, in France, initiated into the mysteries of the new French field artillery of this character, which is interesting scientific gunners so much at present. The application of the quick-firing principle to field-guns of ordinary calibre, although an idea of somewhat recent growth, has been the dream of enthusiastic artillery officers, and of the large war material producing firms, ever since its success was so entirely assured in regard to naval guns. But the difficulties appeared to be insurmountable. The jump and recoil of a field-gun seemed to be inseparable features attaching to its employment. Then there was the prejudice against carrying ammunition fitted with primers in limber boxes; and however one might reconcile one's self to the dangerous character of this last condition, the fact that a very slight movement of the gun in recoil destroyed the elevation and training was fatal to the application of the principle, unless the movement could be absorbed. Messrs. Gruson, of Magdeburg, experimented for years with quick firers of various types, having calibres up to 8 centimetres, and an elaborate system for correcting the deviation in direction caused by recoil, the weight of the carriage being greatly increased by that of the mechanism required; but it was found that the carriage, even when perfectly skidded, ran back nearly a metre, and that it was only with much smaller calibres that the recoil could be absorbed within manageable limits.

In our own country we do not think that the system has hitherto had a fair trial. So great is the feeling of field- and horse-artillery gunners against any innovation from perfect simplicity in the form and design of guns and carriages for their arm of the service, that the very fact of a gun being slung in a cradle, and without trunnions, and of its carriage being provided with recoil cylinders and running out springs or training segments, would be sufficient to condemn it in the opinion of many commanding officers of

field or horse batteries. Nevertheless, it goes without saying that the army of the future which is provided with an artillery armament of satisfactory quick-firing field-guns, and an ample supply of ammunition, will possess an element of dire and terrible potency, against which ordinary field-guns, firing their conventional one or one and a half rounds per minute, would be absolutely nowhere.

Under these circumstances it is satisfactory to learn that efforts are being made by private manufacturers in this country to supply the much needed quick firing field-gun. We have, by the courtesy of the Maxim-Nordenfelt Company, been enabled to produce in our columns this week engravings of their quick-firing field-gun of 7.5 centimetres, which was fired, with remarkable success, upon the company's shooting ranges at Erith, in the presence of Li Hung Chang. We have also been furnished with the following particulars in regard to the gun.

The principal data which have served as a basis in the design of this novel weapon are briefly :

The employment of fixed ammunition with primed metallic cylinders. Closing of the breech with an interrupted screw, of great simplicity, of rapid and easy manipulation, composed of massive parts, and absolutely assuring extraction of the empty cartridge cylinders. Facilities for dismounting, without any tool, of the firing and breech closing mechanism admitting of the immediate change of a "striker," or of its spring. Recocking the gun without opening the breech. The employment of hydraulic brakes, absorbing part of the recoil, and reduction of the "jump" of the carriage. Separate gear for training and elevation to be worked by the "laying number" who sits at the side of the trail; he also to fire the gun. Automatic brakes of great simplicity on the wheels. A light steel shield to protect the "laying number" against rifle bullets or shrapnel. Total weight of "heavy equipment" drawn not to exceed 3968 lbs. Total weight of "light equipment" drawn—for horse artillery—not to exceed 3307 lbs. Employment of a single projectile, with a few rounds of case-shot.

The gun is of the ordinary tempered steel type. Being intended to slide in a cradle, which forms part of the carriage, it does not carry trunnions. The two projections receive the piston-rods of the hydraulic brakes, while upon the right side of the breech are found the lugs of the hinge for the breech-closing gear, and the lugs forming the supports of the extractor. The grooves of the rifling are thirty in number, uniform, and their angle of inclination is 6 degrees. Their width of 5.8 mm. at the commencement diminishes gradually to 4.9 mm. at the muzzle, causing a continual compression of the driving ring during the passage of the projectile through the bore of the gun, which diminishes the chance of gas escape and consequently of erosion. The depth of the grooves is 0.58 mm.

The breech-closing gear is somewhat different to any hitherto employed. The breech-screw is actually conical, but the largest diameter is at its interior extremity. Nevertheless, it hinges out upon the carrier without any longitudinal movement being required, the seating being sloped away to a certain extent to admit of this. This arrangement is said to obviate all possibility of the breech-gear being forced out by excessive pressures. The



extremity of the manipulating lever has a segmental pinion engaging with a cogged segment in the breech-block. The first portion of the movement then makes the block revolve and unscrew 90 degrees, the cogs of the pinion being placed eccentrically to its axis, so that they recede as the block goes out and preserve their engagement. A claw on the pinion now sets against the breech-block and brings it out, instead of making it revolve further. The 90 degree revolution brings the threaded portions of the screw against the smooth portions of the seating. The striker is actuated by a spring pressing between the sleeve and its solid point. Turning the breech-block presses the two helicoidal surfaces upon projections behind the striker, and cocks the gun, the striker itself being prevented from rotating by the directing arm, which can only work longitudinally. This directing arm is prolonged beyond the carrier and ends in a hook, by which the gun can be recocked in case of a misfire without opening the breech. The extractor oscillates around an axis fixed in the two lugs; it has two extracting claws. By the movement of the curved heel the process of extraction, slow at first, finally ejects the empty cartridge cylinder with a jerk. The ordinary trigger mechanism is seen and the firing lever. A safety trigger, composed of a heel at the end of the prolongation, slides in the groove, and prevents the act of firing until the moment when the breech is closed. The breech-block is prevented from oscillating unduly around its axis by a spring button. A bent lever, actuated by a spring, something like the brake on a bicycle handle, secures the working lever of the gun in its position against the breech when closed. The breech-closing gear is provided, when required, with an arrangement for preventing the opening of the breech in the event of a hang-fire having taken place. It is only released by the shock of discharge.

The carriage has a jacket or cradle of cast-steel, in which the gun slides, fitted with hydraulic brake cylinders, favorably situated with regard to the axis of the gun and the line of recoil. The recoil in the cylinders is 12 in. The gun-jacket and hydraulic brake are upon a semicircular platform, being secured by the clamps. The pivot is the centre of movement of the whole system for a training of 9 degrees. The lower part of the pivot and the cushion work by a screw upon the fixed cylindrical axis, secured to both brackets of the carriage. It will be seen, by a reference to the drawing, that the axis of the gun is low down, and very near the centre of the axletree, and consequently that the angle of the trail is a very acute one, if the wheels are of the ordinary height. This is a great advantage, as it prevents jump. A cogged segment, engaging with the endless screw, manipulated by the training wheel, gives training through an arc of 9 degrees without altering the position of the trail. The elevating screw and wheel can be seen. They admit of 15 degrees of elevation and 5 degrees of depression. The sights are fixed upon the side of the jacket, and consequently do not recoil with the gun. This is a manifest advantage. The training and elevating wheels are so placed that the "layer," seated upon the seat, can without any inconvenience, elevate, having the right hand upon the wheel, while with the left he works the training wheel. The elevation once obtained, his right hand is free to pull the trigger and fire the

gun. The extremity of the trail is provided with a short spade for the purpose of further checking the recoil, fixed beneath a plate sufficiently large to prevent the burying of the trail in the ground. The axletree carries at each side, near the wheels, a ring, the position of which is slightly eccentric in regard to its axis, each ring receiving the end of a drag iron, intended to skid the wheels during firing. These drags are in all respects automatic, for the more the wheels have a tendency to turn during recoil, the more firmly are they skidded. On the march the drags are hung at either side of the trail. A trail box for tools, sights, spare parts, etc., is provided. The carriage is provided with a steel shield, 6 mm. thick, of special quality, resisting rifle bullets at a distance of 20 metres.

The following are the principal dimensions and particulars which should be noticed :

	Heavy gun.	Light gun.
Calibre of gun—7.5 centimetres. . . . .	2.95 in.	2.95 in.
Length of gun. . . . .	.30 calibres	24½ calibres
Weight of gun and breech gear. . . . .	734 lb.	634 lb.
Height of axis of gun above ground. . . . .	36.34 in.	33.25 in.
Weight of the carriage with wheels. . . . .	1,828 lb.	1,431 lb.
Angle of recoil upon the ground. . . . .	30 degrees	30 degrees
Weight of loaded projectile shrapnel. . . . .	13 lb.	11¾ lb.
Weight of round complete of fixed ammunition. . . . .	16 lb.	14 lb.

The fixed ammunition is loaded horizontally in limber boxes, thirty-six rounds being carried with the heavy gun equipment and forty-eight rounds with the horse artillery equipment, upon the gun limber. The initial velocity with the heavy gun is about 500 metre seconds.

The above is a very much curtailed description of this new quick-firing field-gun, which appears to answer the majority of the requirements demanded by modern horse and field artillery. It is wonderfully light, well placed on its carriage as to recoil, and the entire weight behind the team considerably less than that carried by our horse and field batteries. One of the principal questions which occurs to us is the supply of ammunition to the quick-firing field-gun of the future, as the limber boxes are exhausted. With rapid work the gun limbers and ammunition wagons would be emptied in a very short time, and the arm would be helpless if there were no reserves handy. This point has, however, nothing to do with the efficiency or non-efficiency of the gun we have been describing. It worked with the utmost smoothness at Erith, in the presence of Li Hung Chang, and the difficulty of recoil appears to have been grappled with in the most masterly manner, without unduly increasing the weight of the carriage. Of course, the spade would not strike into the ground if there happened to be solid rock beneath the trail, but this would probably be an unusual circumstance.

—*The London Engineer.*

#### QUICK-FIRERS FOR FIELD ARTILLERY.

The real strength of the case for the adoption of quick-firers for field artillery hardly seems to us to have secured the consideration it deserves either in our own or in any other country. It is an open secret that France, Germany, and Russia all possess sealed patterns of quick-firing field-guns

which are capable of indefinite multiplication once the funds are forthcoming, but, as in our own country, there is not that weight of expert opinion behind the movement to overcome the inertia of their respective treasuries. The reasons for this want of professional support are well worthy of attention, for though we hold them to be for the most part groundless, they indicate, on the one hand a sound, practical grip of the conditions of modern warfare—a grip that experience has shown to be sadly wanting in the partisans of infantry rearmament, and, on the other, a species of conservative reaction against mechanical processes and improvement which reveals not only unfamiliarity with mechanical development but also a want of grasp of the true tactical principles which are involved in the question. To take the latter first. No quick-firing field-gun, speaking generally, has attained the same ratio of efficiency on the practice ground to weight of load behind the horses, round per round, of the ordinary service weapons. It has either been found necessary to reduce the weight of the shell whilst retaining the initial velocity, or to reduce the velocity whilst retaining the weight of shell, and in both cases as against nerveless dummies the service gun has the best of it.

This brings us to the root of the whole matter, viz., the moral effect of bursting shells against human beings, and the degree of training of the men who direct them. It is quite possible—indeed, it is absolutely certain—that under range conditions, ten 12 lb. shrapnel may and will score more hits on a line of dummies than fifteen 7 lb. shell delivered under the same conditions; but it is by no means so certain that against living targets the rapid bursting of fifteen shells would not produce a greater moral effect, and hence result in a large reduction in the accuracy of the return fire than the ten shells delivered in the same time period. The question does not rest here; it is further necessary to be clear in one's own mind as to what it really is that we require the artillery to do in each successive stage of a general action. First and foremost undeniably comes the attainment of superiority in the artillery duel, and for this purpose accurate and rapid shooting is of chief importance. Burst a shell at the proper height and distance from the opposing gun, and, assuming correct alignment, it will be seen to matter little whether it weighs 7 lb. or 14 lb.; the whole gun detachment will be involved in the cone of dispersion equally well in either case, and the balance of advantage will incline largely to the side which can deliver accurately-aimed projectiles with the greatest rapidity. Next comes the question of either preparing the way for an infantry assault or stopping its advance, and this brings us face to face with factors of quite a different order to those of the practice ground.

Every body of troops, whether infantry, cavalry, or artillery, possesses in itself a certain degree of resisting power, depending on its quality, training, and discipline, and experience has abundantly proved that this power of resistance can be broken down either by a high percentage of loss inflicted in a long period of time, or by a small percentage concentrated into a very short-time interval, and obviously for all practical purposes the latter is the most important to bear in mind. Now, whatever may have been the case with war-seasoned troops of the quality of Napoleon's Old Guard, it is certainly the fact that with the ordinary conscript of European armies to-day

twenty small shells carefully burst in front of an advancing line will create a greater degree of unsteadiness than ten somewhat larger ones bursting within the same time limit, even if the latter actually disable a few more; but we can afford to let this pass as insignificant in comparison to the greater chance of effective bursts the employment of the quick-firer entails. Accurate practice depends on the condition of the nerves of the men who serve the guns, and this again on the cover and physical fatigue involved in the process. This is where the great superiority of the quick-firer lies, and in our opinion all other advantages claimed for the ordinary weapon sink into insignificance beside it. Owing to the absence of recoil the choice of position is widely extended, and where a battery of quick-firers might safely be fought with the muzzles only showing above the crest-line, an ordinary battery would be compelled to fight out in the open simply to avoid the physical fatigue to the men of running the guns up into position on a steep hill-side. This point generally escapes the attention of the manœuvre-ground umpire, where blank ammunition only is consumed, but those who have seen the absolute physical prostration which can ensue among a gun detachment in a long-contested action will not be disposed to underrate its value. A man who has once seen his gun numbers fall asleep under a heavy fire, and had to drag them out of the way of the recoiling wheels, carries away with him an impression that time cannot efface; and if in peace-time, in deference to an umpire's opinion, he fights his guns' in an impossible position, he will generally, in the security of his club or ante-room, express his opinion of that umpire's capacity with anything but respect.

For these reasons alone—freedom in choice of position and absence of the labor of running up—we would unhesitatingly vote for the quick-firer, even were it as far behind its competitor as we have above assumed it to be; but actually the gulf between the two has been very largely narrowed, and is likely to be still further reduced in the near future. Aluminum has already been turned out in the United States possessing a tensile strength equal to that of good wrought iron, and since tensile strength is all we require in the anti-recoil jacket, by the use of this metal we could obtain a reduction of weight, together with a diminution in the measurements of the trail and axle rendered possible by the lessened blow of the recoil. This would enable us to turn out a gun of almost the full power of our present twelve-pounder for an equal weight behind the horses. As regards the increased consumption and additional weight of ammunition quick-firers would entail there remains this to be pointed out: ten shells properly placed within one minute will have pretty much the same effect towards winning a victory as fifty shells equally well aimed individually but distributed over an hour in time; and since no gun can or should be discharged except by an officer's order there is a guarantee against waste of ammunition which, from the nature of the case, is entirely absent from the conditions of infantry fire. In all circumstances, therefore, we feel disposed to predict a future for the quick-firing field-gun.—*Army and Navy Gazette*.

#### REMARKABLE BATTLE CASUALTIES.

Often the army surgeon comes upon a casualty, so curious as to border on the ridiculous. A few remarkable examples were recently given in the



*Evening Standard.* During the Crimean War, for instance, a man was brought into the field hospital badly wounded in the face. On examining the wound the surgeon was greatly puzzled to find that the lower jaw, teeth and all, was firmly fixed high up in the face. Looking where the lower jaw ought to be, he found a second one there quite intact. He thought, at first, that the soldier was a natural curiosity—a man with three jaws. But further investigation revealed the fact that the third jaw was really another man's property, whose possession had been conveyed to the wounded man by the force of a large bullet. Frequently a fragment of a shell strikes a man in the mouth, scattering his teeth, and many of these organs find a home in other men's arms, legs, and even in their eyes. There was a curious relic at Netley Museum some years ago, which some barbarian has since stolen, consisting of two French coins found in an English soldier's leg during the Crimean campaign. As he was a well-known spendthrift, who never had a penny in his pocket, the discovery was inexplicable until it was found that a French soldier, fighting beside him, had had his pocket and all its contents carried away by a missile. Examples of this kind of accident are very numerous, where soldiers are killed, not directly by bullets, but indirectly by objects which the balls force into their bodies. A soldier in the Franco-German War, who was the happy possessor of twenty gold napoleons, was struck in the trousers pocket, and the whole score of coins were driven into his body. The bullet that killed Lord Nelson entered his shoulder, carrying a piece of epaulette with it—often a fortunate occurrence, for it allows of the bullet being easily withdrawn, but in this case, unhappily a misfortune. Everything that a soldier wears or carries on his person is liable to pass into the body, and the probing of wounds is often like the examination of magpies' nests. Pieces of knives and of watches, of boots, belts, buckles, swords, water canteens, keys, coins, etc., are fished out of arms, legs, and bodies after every serious battle; and no doubt there is many a veteran alive and well who has still some relic in his body of stormy times. A curious case was that, in the American Civil War, where a man was struck on the head and rendered unconscious. He remained unconscious so long that the surgeons suspected that the bullet must have entered his head. Yet there was only a small crack in the skull, through which nothing thicker than a knife blade could pass. One day they found a single hair sticking out, a clear proof that the ball had entered, and, on cutting away some of the bone, saw the bullet reposing within, removed it, and instantly brought the man back to consciousness. If not a curious wound, at least a curious result of a wound was that in the case where an English officer was struck on the head during one of our Eastern quarrels. He received a wound while giving a command to his men, and fell insensible before finishing it. He was taken off the field, brought home some time after, and placed in hospital, being all the time unconscious. But when the piece of depressed bone was raised off his brain, he started up in bed, and in loud tones finished the command that he had begun some months before in a foreign land.

Round balls used to commit strange freaks in the old days. At the battle of Alma a soldier was struck by a cannon ball and fell dead. When

they took him up the huge mass rolled out of his body. It had been stopped by the elastic skin of the back. Spent balls had a singular way of rolling over men's bodies and causing terrible destruction, without leaving any external mark. During the Indian Mutiny a fatigued gunner lay on a gun to rest, the ground being wet. Presently a well-directed ball from the Sepoys passed over his body, cutting away the projecting parts of his vest and breaking his arm, but apparently doing no further injury. Three days later, however, the greater part of his leg fell away. He had not at the time of its occurrence perceived that the ball had pressed heavily on his leg, and he died a firm believer in that very prevalent military fallacy—"windage." A somewhat similar case occurred in the Crimean War, when an officer in the 42d Highlanders was struck in the body, fell, and died while being carried off the field. Not a trace of injury could be seen, and his brother officers came to the conclusion that he died from excitement and "windage." But, on opening the body, it was found that all of the internal organs had been ruptured. Perhaps it is not irrelevant to give one or two of the evidences which clearly prove that there is no such thing as windage. A British officer at the Crimea had his ear carried away and his hair shaved off by a passing ball, but was little the worse for it. If such a thing as windage existed he must have been killed outright. At Bayonne, while an artillery officer was sighting a gun, a surgeon standing close by saw a ball career along, pass between the officer's outstretched legs, and take off the lapel of his coat without his knowledge.

Accidental wounds are numerous in all battles, resulting from explosions, premature discharges, awkwardness of young soldiers, and other things. During the New Zealand campaign the Maories in one engagement, wounded sixty-eight British soldiers, while the British, for some inexplicable cause, wounded ten of their own number. And it is said that during the Crimean War one-third of the wounds treated were accidental. But, no doubt, many of these supposed accidental wounds were really inflicted by the enemy, for there is a widely prevalent belief among a large number of wounded soldiers that they have been shot by their comrades from behind when they have actually been shot by the enemy in front. This is often owing to the curious fact that the first twinge of pain may be felt, not where the bullet enters, but where it comes out. A bullet hit an officer of the 7th Fusiliers at Inkermann in the neck, and passed out behind. He thought he had been pricked from behind with a sword, and turned round to see the officer in his rear fall dead from the same bullet. While effecting a landing, during one of our foreign wars, a soldier turned angrily and asked who had struck him on the back of the leg. He had been really shot from the front and the bullet had gone out behind. At Netley Hospital, after Tel-el-Kebir, there were many men who could never be persuaded but that their comrades had shot them from behind, though the doctors well knew, from the characters of the wounds, that the bullets had entered in front. Pain, in fact, plays the strangest tricks on soldiers. When a bone is broken, or a nerve ruptured, it is intense, but if the ball only passes through flesh the sensation may resemble a blow from a stick or not be felt at all. A great deal depends on the temperament. Some faint, and even die of shock, from

wounds which others scarcely feel. An English officer had part of his finger shot off, and he rushed round screaming with agony, and losing all control of himself. Another had his arm carried away from the shoulder, and rode fifteen miles before fainting. "Like a hit from a sledge hammer," a man wounded by the Lee-Metford rifle said the sensation was. Others say the wound is like the passage of a red-hot wire. In a recent battle, an officer felt a heavy blow on his leg, but did not know his leg was broken by a bullet till his foot fell out of the stirrup and he could not lift it back. A soldier was hit by a bullet in the arm and, at the same moment, a thorn stuck in his foot. He stooped to pull out the thorn, but did not know his arm was wounded till he saw the blood trickling down. A sergeant received a surface wound, two inches long, on the ankle, and, thinking it was an insect that stung him, stooped to brush it away. But the flow of the warm blood told him what had happened. Both legs were carried away from an officer in the Crimea, and the first thing he knew about it was when he tried to stand up, and could not. And often soldiers have arms shot off, or receive other severe injuries, and know nothing about them till told by their comrades. So that, terrible as the carnage is to look at, the sufferings of actual battle are probably not very great.—*United Service Gazette*.

#### COVER AND SCREEN.

"Cover, Screen, and Illusion" is the title of an interesting paper by Major M. Martin, Royal Engineers, a paper which cannot fail to repay perusal. Major Martin, with the writings of all modern authorities to guide him, is of opinion that strategically a defensive campaign is almost invariably disastrous, small beginnings in the direction of defensive works having a tendency to grow into a purely passive resistance if allowed to control the plans of commanders. Tactically it is equally true that excessive resort to defensive works and cover has not unfrequently caused a paralysis of offensive vigor, a thing to be guarded against. Engineer as he is and apt as he might be to defend defensive works, Major Martin holds that tactics absolutely overrule field engineering. He goes further, and asserts that field cover and its provision or utilization is not the exclusive function of technical experts, but a part of the fighting tactics of all three arms whenever applicable to the tactical purposes immediately to be pursued. "Master the spirit of tactics," it has been said, "and the details of defense will come of themselves." Admitting the full force of this reasoning, Major Martin seeks to lay down one or two principles bearing immediately upon the subjects embraced in the title of his paper. It is always gratifying to follow the arguments of a large-minded man, and our author shows himself to be that. Of course, the first thing to be considered is cover. The details of field cover, it is held, need absolute modification from time to time as progress is made in modern artillery. To quote the words of the paper:—

"The causes of revolution are chiefly increased accuracy and range, but 'cover' itself is more affected by the greater power and penetration of projectiles, by improvements in fuse ignition, by the use of high explosives, and by the probable use of howitzers with more curve in the trajectory and throwing more powerful shells, common and shrapnel."

Smokeless powder will give some slight extra concealment to both sides from counter observation in the next war, while generally increasing the accuracy and rapidity of artillery fire by the removal of the obscuration of the smoke. Formerly in artillery duels the guns themselves suffered comparatively little loss. The men and horses have suffered much, and these have compelled the withdrawal of the guns usually uninjured. But with high explosives it will be more common for the guns themselves to be destroyed. These are points upon which stress has to be laid, for they naturally will produce a considerable effect on all matters of cover. Major Martin complains that forest defense is a question too little studied and provided for in our service. It is often recommended to form clearances which would involve felling acres of trees. Yet our British battalions have few axes, and even were supplies available when required it is doubtful whether the game—of forest-felling—would be quite worth the candle. Canadian or Australian lumbermen or backwoodsmen would give excellent results if they could be brought into acquisition, but the capacity of "Tommy Atkins" at tree-felling—a trade in itself—is reasonably doubted. Foreign armies have a larger element of forest-born recruits, better fitted to deal with such eventualities than our own—for the most part town-bred youths. Is this taken sufficiently into account? On this head we read:—

"We can never be sure a future campaign will not be in forest country, and it would appear advisable to develop the existing organization of infantry pioneers so as to act as instructors to a larger proportion of the bulk of the infantry. This system is, indeed, laid down in the Queen's Regulations, but little has been found possible, far less has it been found feasible to develop further the system of instruction foreshadowed."

In this connection Major Martin is undoubtedly right when he questions whether the pick and shovel are the sole tools useful to our infantry. In many cases he maintains that axes and saws would be far more to the purpose. In a loose sandy desert, for instance, such as British troops have had so much experience of in late years, of what practical value would a pick be? The conditions and circumstances of the scene of campaigning govern to a large extent the instruction which is necessary and equipment to be provided. As Major Martin reminds us:

"The defenses of Plevna caused the Russians to raise their artillery force to the proportion of eight guns per 1000 infantry, an almost unheard-of average, and when the march on Constantinople commenced and continued, a large proportion of this artillery had to be left behind. It is probable, therefore, that in future wars every effort will be made to bring a very large artillery force into action in the first engagement, especially against a defensive position, and this force will, it is said, comprise besides howitzers, guns stronger than ordinary field or even position artillery. Besides the weight of such guns themselves, increased power in shells means increased difficulty in transport, and the heavier natures of ordnance may have to be abandoned if the subsequent campaign becomes one of march and manœuvre."

Such conditions will react on cover and affect its use, so that it is not a subject to be lightly dismissed. Our own army has had no recent ex-



perience of meeting artillery fire in the field, and it will require not only great forethought, but will form our first consideration how to deal with the artillery phase of the action, utilizing cover as tactics may dictate, and never forcing the tactical consideration into subordination to academic perfection of defensive details.

Major Martin offers three suggestions, all of which must recommend themselves to the thoughtful student :—

“ First, to eliminate from our books and courses of instruction all models and details which have become not only obsolete but positively dangerous ; second, to carefully discriminate between war against a savage enemy consisting of infantry alone, or infantry and cavalry ; and third, it would appear that these details of cover should be dealt with more in a tactical spirit and with reference to the two kinds of warfare in separate volumes, as otherwise one paragraph must be corrected by the next to qualify the use for which any particular model is suitable.”

Screens are formed frequently enough of cavalry, light troops, or of all arms. A good illustration of the advantages of screen is furnished by the action of Tashkessen, which is further interesting as the last occasion on which a British officer commanded in action against European troops. We will let Major Martin tell his own tale :—

“ The causes that led to this action may be rapidly summarized. Shakir Pasha with a Turkish army corps was holding the pass through the Etropol Balkans served by the road from Orkhanie to Kamirli, at which latter position his force was entrenched. After the fall of Plevna, Gourko succeeded in turning this pass by utilizing the mountain paths by Tchuriak, and debouching on the plain succeeded in threatening the retreat of Shakir on Petric. To delay Gourko, General Baker, with a small force of 3000 men and five guns, took up a position at Tashkessen and forced an action, although his position could have been turned. As it was only necessary to hold out till the evening of December 29, 1877, Baker occupied two positions, a false one in advance, and a real one a mile in rear separated by a valley. To his great joy Gourko deployed nearly 40,000 men and three batteries to attack the false position, sending a division to each flank to thoroughly envelop it, and the hope then occurred to Baker that if these large forces arrived massed and disordered in the advanced position (really a screen) he might from the real one be able to repulse them, though the odds stood at  $12\frac{1}{2}$  to 1. Baker's original plan was the defense of successive positions, but the one suggested by Gourko's premature attack was evidently better. The attack began at daybreak, and by half-past 12 Baker had retired to the main position which was entrenched, having  $4\frac{1}{2}$  hours of daylight to hold out, and the attacking force being clumped and difficult to extricate for even a fresh front attack, still less to form fresh flanking columns. Baker's position was on both flanks of the road, commanding which was a strongly-built ‘khan,’ or traveller's ‘serai,’ fit to resist field artillery, and in which he placed four companies. Close by in a yard he hid two mountain guns, which, being masked, acted subsequently with the force of a surprise. On his left his battalions were able to entrench and used the Turkish trench. This form had been found capable of withstanding both

infantry and artillery fire and cannot easily be improved upon. A small shelf, or 'berme,' however, might be added near the crest, to rest the elbow on, give better cover to the man, and hold his loose cartridges. It is necessary to avoid allowing this trench to be made too deep as the men then sky all their cartridges. On Baker's right the ground was too stony to trench, but he permitted the erection of stone walls, which he knew would be harmful under artillery fire, sooner than lose all protection against bullets. In the case this was a wise decision, but each case must stand by itself, and here a great portion of the Russian artillery was diverted to Kamirli. The defense held out till nightfall, and after losing about half of its total force had sufficient vitality to repulse a final charge of the Russian guard with the bayonet after an action of ten hours, which combined active manœuvring with a very trying passive defense. Baker here employed cover, screen, and illusion, and gave a further instance of the last before his retirement during the night. The opposing sentries were only at twenty yards distance, and the Turks substituted dummy ones with perfect success and effected their junction with Shakir at Petric unmolested. It turned out afterwards that Gourko had further been deluded by telegrams found in the office he seized into supposing that he had the main Turkish force in front of him, otherwise he could have easily retained Baker and spared a force to seize the Acha Kamirli defile and cut off Shakir. Since the Russo-Turkish campaign artillery has made enormous advances, and if at that time it was several times possible to compel the surrender of large bodies of men entrenched by shrapnel fire alone, the possibilities of its future action are hard to over-estimate."—*The Army and Navy Gazette*.

#### THE TEST OF LONG RANGE FIRE.

In order to test the efficiency of infantry fire at long ranges under certain circumstances, an experiment was made in Switzerland by firing from the hamlet of Replands, at an altitude of 3760 feet, at a surface of snow, about a mile and a quarter off as the crow flies, at the foot of the Mont de Baulmes. The target was a rectangle 165 feet wide by 200 feet deep, sloping at an angle of 10 deg., and was marked at the four corners by flags, and rendered more conspicuous by a piece of black cloth, 8 feet by 10 feet, spread at the base of the rectangle. Fourteen medium shots were told off to fire independently a total of 500 carefully aimed shots within sixteen minutes, between 2.15 and 2.31 P.M., the weather being very fine, with bright sunshine and a dry and perfectly calm atmosphere. The thermometer indicated 20 deg. Fahrenheit. The snow was hard frozen, smooth, and free from any mark, and the slightest graze of the surface was distinctly visible, so that every hit could be clearly traced. It was found that out of the 500 shots, 338, or 67 per cent., had hit the target, besides twenty which had struck above, and twenty-six which had struck below the rectangle; within a radius of about 30 feet. The remaining shots struck within about 100 yards, either short or over the target, while a very few had deviated sideways.—*La France Militaire*.

#### CAVALRY SCOUTS.

The *Invalide Russe* has recently published new regulations concerning

the constitution of the special body of cavalry scouts, which have been approved by the Czar on the advice of the Council of War. This is a matter that has long received very careful attention in Russia, where it is maintained that the work of scouting can only be confided properly to picked men, of assured intelligence, physically vigorous, with keen sight and excellent hearing, who have been subjected to special training. Of such selected men sixteen will serve with each squadron, and will receive the prescribed instruction, which will be given also to all non-commissioned cavalry officers. In order that the best men may be secured for the service the principle of selection will operate continually. Those who prove inapt will be replaced by others, while men who display high powers during a continued period will receive a special badge on the shoulder-strap, and will enjoy particular advantages. Great care is bestowed upon the mounting of these scouts, and their training is directed in each squadron by an officer selected for his special interest in scouting and his physical aptitude for the work. One advantage given to the scouts is that, after two years' service, they will be promoted as supernumerary non-commissioned officers, without having gone through the special training for the grade, on the condition that they remain on the roster for scouting duties.

#### THE JAPANESE RIFLE.

With regard to the rifle used by the Japanese and the nature of the wounds caused by it, Captain Elliott goes on to observe: "All rifles are made at the arsenal in Tokio and are called by the inventor's name Murata. They are of two patterns. The one used by the great majority of the troops was a single-loading bolt gun of .44 calibre, sighting to 1400 m. without wind gauge; the other a magazine gun of .315 calibre. The stocks are very short and the cheeks wide." As to the effect of the rifle bullet wounds Captain Elliott reports: "While in Tientsin, China, I visited several times the hospital under charge of Dr. Irwin, surgeon to Viceroy Li-Hung Chang. Wounded Chinese soldiers were treated here during the winter. Surgeon-Major James, of the British army, had charge of some of the wards, and was much interested in wounds made by the small calibre, enveloped bullet. He kindly gave me every opportunity to see and much information in regard to these wounds. I saw about thirty of the wounded. In no case were bones shattered to any extent, even at the exit of the ball. The puncture was clean; no bullet was found in the patient, so that casing was unknown, whether of steel or a softer metal. They did not seem to deflect on striking, but cut their way through in the line of flight. Thirty patients testified they had received their wounds at distances varying from 150 to 400 yards. They healed readily, often by first intention. None of the wounds were in the leg, for the men had made their own way from the battlefield on foot or in carts to the railroad, more than 200 miles, and were several weeks on the road. All suffered more from frost-bitten feet than the bullets. Out of the thirty cases I saw I think probably the old .45 calibre lead ball would have left on the field nine of them dead."

#### TRAINING OF BICYCLISTS IN GERMANY.

The *Militär Wochenblatt* has recently given some particulars of the

*Fahrrad-Vorschrift*, or instruction concerning the training of bicyclists in the German army. The first part of the instruction is a description of the machine, which, as we learn from the *Deutsche Heeres-Zeitung*, is a small safety with 1½ in. cushion tires, there being two types, one of strong build for training and the other of lighter character for use in the field. The second part of the instruction relates to the care and cleansing of the machine, and the third to training. The *Wochenblatt* informs us that the period of training is divided into three parts, and that the number of men under training will be in the proportion of three to each available machine. Preliminary work begins in October, so that before the winter comes on the man is at home on his machine, and his practice is kept up during the winter months by two hours' practice weekly. From March onward the second period of the training is to fit the man to have perfect control of his machine, so as to be able to gain the full use and advantage of it. He is thus to be competent for military cycling duties during the manœuvres. Hand in hand with this work the third section of training—the theoretical—goes on. It relates to the building and repair of machines, the disposition of weights, the carrying of the rifle and revolver with which the military bicyclist is armed, precautions to be taken in regard to heat and cold, the police regulations of various towns, and so forth. As will be seen, the instruction is concerned with the training rather than with the employment of the bicyclist. It concludes by saying that a number of men practically trained upon the lines laid down will soon render it unnecessary to employ civilian riders, which has hitherto been done, during the manœuvres.

## A NEW NAILLESS HORSE-SHOE.

So many kinds of nailless horse-shoes have been found wanting when subjected to exhaustive trial that we have hitherto refrained from giving any opinion on the "Minerva" shoe, which has called forth so much comment in the press. It has been known for nearly a year that General Von Wittich, the commander of the 11th German Army Corps, has been experimenting with it, but what his views were had not until recently been made public. He has now stated that the results are very satisfactory, and has given an order for a further supply of the shoes. This is thought to justify some inquiry as to the merits of the invention, and that opinion is confirmed by the fact that the pattern has been placed in the museum of the Royal United Service Institution. It can there be examined by officers of the mounted services and by horsemen in general. Several veterinary authorities and other experts have positively asserted that the invention solves the nailless problem, which has baffled all previous inventors. There is also a large amount of testimony in its favor from horse owners who have used the shoe during the past twelve months. Briefly, we are told that, while holding tight and firm in its place, it yet allows the hoof to expand naturally, it obviates the possibility of pricking or pressing on the sensitive part of the foot, it wears longer than the ordinary shoe, and can be put on or taken off by an inexperienced man. If these claims prove to be well founded it is evident that we are about to be furnished with a shoe, the value of which for military purposes it would be difficult to overrate.



In this instance the Royal United Service Institution is, as usual, in the van of progress. It is to be hoped also that the military authorities will deem the matter of sufficient importance to order trials of the shoe in various branches of the service.—*Army and Navy Gazette*.

#### THE EFFECT OF ELECTRICITY ON THE FLIGHT OF PROJECTILES.

The Committee of the Federal Shooting Association made a curious discovery lately in tabulating certain results of shooting. It observed that on the range at Winterthur the majority of shots fired at the targets on the right of the range struck to the right of the bull's-eye, while on the targets on the left of the range the greater number of hits were to the left of the bull's-eye. It was further discovered that all the projectiles constructed either partly or wholly of steel had become magnetized during flight.

The Federal Experimental Committee having had these facts brought to their notice, thought that possibly they might have some connection with the existence of the numerous wires used for electric bells and telephones on either side of the range. Several additional experiments were made on other ranges, and the results fully bore out this theory.

An electric current of 8000 volts was installed on the range at Thun by means of four 18 mm. cables laid parallel to the line of fire and 40 m. from it. In order to define the trajectory, screens of thin paper were fixed at every 10 m. along the range.

The first trials were made with the 1889 pattern rifle. The influence of the electric current made itself felt at once; at 260 m. the lateral deviation was already 24 m. The trajectory showed a very remarkable curve towards the electric current.

A second trial was made with the Japanese gun of 3.3 mm. invented by Colonel Yamagata. The minute bullet went straight for the electric wires, broke two insulators, and followed along the wires, finally wearing out its energy with the friction.

Experiments were then made with artillery. The results obtained were no less startling. The range was 3000 m. and the electric current was installed as before, commencing at 2800 m., *i.e.*, 200 m. in front of the target. The lateral deviation of the shell (common) was  $14^{\circ}$ . Firing with shrapnel produced even more curious phenomena. The head of the projectile, carrying the fuse made of a non-magnetic metal, was completely detached, while the body was attracted by the current, the bullets after burst showing such extraordinary variations that all accuracy of fire was totally done away with.

It was proved by these experiments that the force of attraction increases in inverse ratio to the weight of the projectile and also to its velocity. A section of infantry exposed to the fire of hostile infantry at 300 m. and having on one flank an electric current (by means of a dynamo or accumulators) would have nothing to fear from the enemy's bullets. A company at 500 m. could be protected in a similar way, and a like arrangement would be a safeguard from artillery fire at from 900 to 1400 m.—*Journal de Genève*. Captain W. C. Hunter-Blair, R. A.

# Comment and Criticism.

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## I.

### "Congress and the National Guard."

First Lieut. W. E. Birkhimer, 3d Artillery.

UNDER this head I note in the last copy of the JOURNAL a continuation of the amiable contention between Colonel Rice and myself that has found space in the columns of that periodical at various times during the past two years. The point in dispute has been whether or not the National Government can safely trust to State militia, temporarily called into the service of the United States, for general war purposes, the Colonel taking the affirmative and I the negative of the proposition. Some other questions have arisen as merely incidental to this; but they were treated, as they are, as of wholly secondary importance.

The Colonel's last article, evidently for the congressional eye, does not call for extended notice, on my part, notwithstanding references to myself that bordered on the personal; rethrashing old straw one's self or furnishing another an excuse for so doing is tiresome to intelligent readers, and not to be encouraged in professional papers. Moreover, the injection of even a suggestion of the personal feature into such papers at once removes them from the domain of legitimate professional literature.

One reason why militia have not been regarded as reliable in the contingency mentioned has been the danger which in times past has existed, and now exists, that a governor, who is undeniably Commander-in-chief of the militia of his own State, may not respond promptly to the call of the President. As the only new feature in the Colonel's latest paper is the graphic manner in which he demonstrates how and why this fatal difference of opinion between these two high officials may arise, thus to this extent confirming the views upon this point that I heretofore have urged, I will confine my present remarks to this branch of the subject.

A governor would not refuse, observes the Colonel, to honor the requisition of the President for troops unless the war was decidedly against his own judgment, and that of his people. This, I think, concedes everything that those contend for who maintain that troops who for these reasons may be withheld are not such as the general government can rely upon to fight its battles. The Government of the United States is no such rickety affair as to depend for existence upon the peculiar views of the necessity of the war held by the governor of a State. The experience of the Colonel's own State in 1894 during the Chicago riots affords light, if not upon this, then upon a kindred subject. The gravity of the then situation regarding the peace of the country and the stability of our institutions was generally recognized by thinking people; and certainly very recent events have emphasized the admitted fact, that in dealing with the condition of affairs at Chicago fundamental principles of government were involved. Yet what do we behold! The governor of a State, in which this condition of affairs existed, protesting against the action of the

President in sending United States troops to enforce there United States laws. Here was a clearly cut case of a radical difference of opinion between these two officials upon a point vital to the interests and peace of the country. Can we presume that war might not develop a similar disagreement? Who in this country that has been a close observer of events during the past two years will assert that during a war such fatal difference of opinion is unlikely? Is it to be maintained for one instant, that the President, in prosecuting a war, is to be placed at the mercy of a State governor who, as the Governor of Illinois did, may differ from him regarding the wisdom or necessity of his war measures. And be it remembered that United States troops were not sent to Chicago until the Federal judicial officers had represented that the process of Federal courts could not be executed through ordinary means, and proof furnished that conspiracies which otherwise could not be suppressed existed against commerce between the States. Yet not only did the governor protest against United States troops being sent there, but he has since protested that their presence, far from exerting an influence for good, served only to excite and irritate the populace.

Is, then, the United States to be turned over bound hand and foot in the hour of peril and trial to such governors? Never! If so, then, as well expressed by President Madison, the United States is not a government for the purpose most of all demanding it. The Constitution does not leave the United States in any such predicament. Congress shall have power to raise and support armies. That is the emphatic language. The taking the militia of the States into the temporary service of the Federal Government is an altogether different matter, in which, as experience has shown, and as avowed by Colonel Rice, the will of the Commander-in-chief may be thwarted by the governor of a State.

In referring as I have here done to the Governor of Illinois, I intend no disrespect. The facts herein cited and so well known serve to accentuate the point here sought to be emphasized. That the governor is a conspicuous politician; that he stands high in the councils of one of the great parties of the day; that except for the accident of foreign birth he would, as the Colonel informs us, have been a candidate for President; that he was, as the public prints inform us, overwhelmingly defeated in the second race for governor, neither fact has, nor have all combined any influence in this argument, in which he is treated as possessing all the virtues and attainments that could adorn his high station. The simple fact alone is considered that, upon a matter of vital importance in a governmental crisis he resolutely and uncompromisingly set himself in opposition to the military measures of the Federal chief magistrate. And from thence the inference naturally follows that State troops, of which such a governor is the Commander-in-chief, do not form a force upon which the Federal Government can depend to vindicate in war either its integrity at home or its honor abroad.

In conclusion I have only to remark that the Colonel, in referring to the expedition of General George Rogers Clark, in 1778, beyond the Ohio, as an invasion of foreign soil, certainly departs from his usual accuracy. That territory was claimed by Virginia, as part of her soil, long before Clark's expedition of 1778. In various Virginia laws of anterior date, this was avowed. General Clark, therefore, in expelling the British, was doing no more from a Virginia stand-point than driving an intruder from her territory. The evidence of this is manifold: but it comes out conspicuously in the Act of the Virginia Legislature organizing "Illinois" into a county and giving it a government. The preamble of the act recites that these British posts had been held by the enemy within the limits of the Commonwealth, but the British had now been expelled. Moreover, all Virginia laws before this, touching the militia, had explicitly stated, whenever the subject was mentioned, as it frequently was, that they were not to be used beyond the territory of the colony.

Presidio of San Francisco, Cal.

November 12, 1896.

## II.

## "The Sioux Campaign of 1890-91."

First Lieut. H. L. Hawthorne, 1st. U. S. Artillery.

I HAVE hesitated to make myself again a mark for the personalities of the writer of the JOURNAL article on the "Sioux Campaign of 1890-91," but the complete support which I have received from other eye-witnesses of the fight which he so badly describes permits me to insist that Lieut. Richardson's account is very misleading.

Of the nine items to which objection was made, Lieut. Richardson defends five, thus allowing the remaining four to fall within the category of "wholly imaginative." Lieut. Richardson denies that he charged the Seventh Cavalry with entertaining a feeling of revenge and yet he wrote "I am not inclined to withhold some justification to the 7th Cavalry, who *still carried the memory of Custer and the Little Big Horn.*"

The map to which Lieut. Richardson refers was constructed by an officer who was present, and the dispositions of the troops shown were made on the combined recollections of most of the officers who took part in the fight. From Lieut. Richardson's study of this map, he thinks that some of the soldiers were killed by the fire of their comrades. The officers who saw the fight and who helped to construct the map declare that no such thing occurred. Lieut. Richardson could have easily secured this evidence before he wrote his history, for the asking. He prefers the second-hand testimony of Indians. An officer says "I studied the dispositions and positions of the troops and I could not see how they could be better disposed on that ground to accomplish their purpose than they were." The fact is that Lieut. Richardson is publishing camp tattle, the source of which was questionable in the beginning and which received its quietus years ago.

On the question of prepared resistance, Lieut. Richardson asks why the Indians gave up 48 guns before the rush began, intimating that they were thus weakening voluntarily their power to resist. One of the officers who found these guns states that they were "about 31 or 32 old 'squaw guns,' some of them were muzzle loaders, the old Yager or squirrel rifles, and scarcely any ammunition." The Indians must have regarded the loss of these with complacency.

In the original paper Lieut. Richardson says that the Hotchkiss gun continued to fire long after resistance ceased. In his "Reply" he says that he stated that "firing continued after resistance had ceased." Both statements are incorrect. An officer testifies, "The last shot fired of that fight was fired by one of Big Foot's band and killed one of Captain Jackson's men."

As to the character and attitude of Taylor's scouts, I cannot see what the splendid service of the Indian Police at Standing Rock has to do with them. Lieut. Richardson might just as logically have challenged me to beat the record of Pocahontas. An officer says laconically of these scouts, "They were no good." Another says "One of them shot at me the next day, and some of them yelled friendly messages to the hostiles." Such testimony ought to shake the gullibility of the most ardent Indian admirer.

Describing the fight, Lieut. Richardson says, "185 Indians were reported killed and a few were taken wounded into Pine Ridge." Any reader, I am sure, would gather from this that these 185 were killed on the field; whereas the writer meant that, in addition to the "few" who "were taken wounded into Pine Ridge," there were also quite a number of the "185 killed" who were taken wounded into Pine Ridge and who subsequently died, some probably from the severity of their wounds and some certainly because of refusal to receive proper surgical treatment. The author's mingling of the final and the im-



mediate results was the reason for my criticism on this point. 135 seems to be about the probable number of those killed on or near the field.

Major Whitside, who made the capture and who counted the warriors in line of battle gives their number as 120.

The only point in which there is a disagreement in the recollections of those who took part in this fight with whom I have corresponded is the number of soldiers engaged. None agrees with Lieut. Richardson, all giving figures below his and making his estimate of "more than four times" the number of Indians an erroneous one.

Reports of secretaries cannot teach the eye-witnesses anything concerning the events of that day. There is no necessity for writing a correct history of that bloody struggle. Care should be taken, however, to check writers who decline to get testimony at first hand, but are contented to obtain inspiration from "well known facts," nameless "reliable sources" and the artful Red-man, especially if he be anxious to present the Indian's "side."

### III.

#### "The Status of Medical Officers."

"THE difficulties encountered by the artillery in solving the problem of the proper status of their associates of the medical department would be lessened in some degree by a preliminary elimination of the personal equation," writes Major Kilbourne in the September number.

This gentleman may, perhaps, not be aware that the pamphlet which called forth a partial reply in the March number of this journal contained a distinct attack on the artillery arm of our service. The author of the pamphlet endeavored to show that in Russia there had been a certain development in the artillery and engineers from a nearly civil status to one only partially military even at the time of writing. From this statement of facts he proceeded to excuse or give reason for a similar form of development in the medical department of our own army. The author found himself obliged to wander rather far afield in his endeavor to find a present example of such development, which, by the way, was not quite correctly stated even then, for the reorganization of the Russian artillery, with the Grand Duke Vladimir at its head, had placed that arm in a position similar to what it holds in all other services. This took place some time previous to the appearance of the pamphlet in question.

A reading of this portion of the article naturally leads to the inference that a similar development had taken place in our own service, and that this again aided the argument; and herein lay the sophistry and herein the attack. That no such change has taken place in our army, either regarding the artillery or engineers, is too well known, among those who know anything of such matters, to admit of question—a legislator, however, might not know.

Formerly, in fact, when the engineers and artillery formed one corps the status of the artillery was much better in every respect than at present. Many claim that when the engineers and ordnance divorced themselves from the artillery they not only took most of the influence and many of the most talented officers, but they also took more than quite a just share of employment and prerogative, and left this arm in a position from which it has never recovered—a body without a head, and without much voice or influence regarding questions which in other countries fall to it as a matter of course.

We enter upon these details to show justification for the reply, and to indicate how ill-suited was the pamphleteer's argument to the case in point, especially when we consider to what the argument led, namely, an attempt to obtain eligibility to command

over line troops and other staff corps by the indirect means indicated in the pamphlet, a means which naturally roused the ire of those affected by it.

Because a certain development had taken place in the Russian artillery did not in any way warrant a similar one in the medical department of the U. S. Army, nor was the inference just that any such progression had occurred in respect to our own artillery force.

We hardly need the reminder "that an army is organized for war"—not for promotion—in fact it was with this idea in mind that we ventured to demur, mildly as became our station, against abnormal development to the detriment of the fighting element. It is exactly here that the crux of this whole question finds itself, so to speak.

An army properly organized for war must possess its various elements in harmonious proportions. If it have more artillery, for instance, than the exigencies of the case demand, the whole body is hampered by such excess; so too with the medical element, if the zeal of its officers for self-advancement has been carried beyond the bounds of equity and a just regard for the principles of military economics, then others suffer in just such proportion as these limits are exceeded or principles disregarded, and we firmly believe this to be the case to-day.

But our critic contends, "that equity demands for the medical officer a compensatory recognition of the lack of assistance in the preparation for its service. It has been freely accorded in the form of rank." There can be no doubt about the accuracy of this last sentence; but has not the medical officer already been properly compensated upon entry into the service?

In order to obtain certain properly fitted officers, the Government offers a professional education to a carefully selected number, who are to devote their lives to its service, if need be; to the medical officer it offers the position of assistant surgeon with rank of first lieutenant of cavalry, thereby placing him at the start above about 450 officers already in service, besides the pay, which is considerably more than young doctors usually receive on their first appointment, and some time thereafter. This is sufficient compensation, and there is no reason why they should thereafter be promoted faster than engineer or ordnance officers.

That rank has been "freely accorded" is abundantly shown by the careers of the two gentlemen in question. The writer of the pamphlet entered the army in Nov., 1874. When he had attained five years of service, and, thereby, the rank of captain, he passed over the heads of some 300 officers, a goodly number of whom, in all branches of service, had been serving under fire in the late war at a time when this young medical officer was hardly out of short clothes. He received his majority in June, 1891, and superseded 180 captains by the operation, a total of 480, which even in our small army might be considered quite a respectable pair of jumps. Many of these captains had rendered distinguished service during the war and since, but nothing availed to save them from the humiliation of being outranked, outpreceded, and dominated, in a *military* sense, at every court, board and function by an officer from 14 to 17 years their junior, simply and solely because he was a *medical* officer. He must be "compensated," no matter at what cost to others who must suffer as a result of such compensation.

The other gentleman entered in June, 1875, and attained his majority in Feb., 1894; and while his case may not afford so marked an instance as the other, it offers no such material difference as to occasion remark.

Can any one imagine a better deadener of professional soldier pride and military spirit than such examples afford? We cannot.

The engineer officer who graduated at the head of his class in 1875 did not attain his majority till well into 1896. Recently a former line officer who entered the army the same year, and who obtained his educational equipment without expense to government,

received promotion to a majority in the quartermaster's department, and another line officer who graduated in 1875, after distinguishing himself by unusually hard and successful work in the line of his profession, received appointment as major in the Adjutant-General's department. These examples are typical in more ways than one, and the promotions rapid, but the medical officer of corresponding date ranks them all by at least two years, and fifty files in relative rank.

If we compare the total pay received by these medical officers with that of engineer or ordnance officers of their own date, we will find abundant reason for thinking that they have received sufficient pecuniary compensation for having had the goodness to provide themselves with a professional education, while if we pursue a similar course with reference to line officers we will find a difference fully equal to supplying the means for more than one medical equipment.

And yet the craving for "compensation" is not satisfied, and these gentlemen have now added a demand for eligibility to command over their less fortunate military brethren, whose professional soldier prestige excites their cupidity. Verily medical equipment "comes high" in these days of large endowments and abundant educational facilities.

Among medical officers there are some half dozen who endeavored to maintain a place in the military competition at West Point. Failing, they adopted a profession "whose *raison d'être* has nothing in common with that of the profession of arms," according to Surgeon-Colonel Hill-Climo. These gentlemen are the only ones among medical officers who can claim to have received military knowledge or training. If these were properly declared unfitted for the profession of arms, how about the others?

Eligibility to command outside their own department has not been conferred upon medical officers as claimed, and all the "maintaining" in the world will never make such a step either just or proper.

No wonder that Surgeon-Colonel Hill-Climo should declare that there was no end to it, that one demand simply led to another.

An English officer of rank once said to the writer: "If you treat your fighting element relatively badly in time of peace, if you confine the officers to subordinate rank during the best part of their lives, where they can cultivate no initiative or independence of judgment, how can you expect that they will serve you well when the time of trial comes?" What incentive to military excellence can there be among professional soldiers if at last they are to find themselves commanded by a set of medical officers who have obtained excessive promotion simply by way of "compensation" for the relatively paltry consideration that they have furnished the means for their professional education before entering the service?

If our army were organized mainly for sanitary purposes, it would be perfectly just to accentuate the sanitary element, but if it is, as stated by our critic, organized for war, then it is the professional soldier element that may justly claim primary consideration.

# Reviews and Exchanges.

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## Personal Recollections and Observations of General Nelson A. Miles, U. S. Army.\*

THE "Personal Recollections of General Nelson A. Miles," published by the Werner Company of Chicago has been awaited with pleasant anticipation by the many personal friends of the writer to whom the charm of a personal narrative emanating from so distinguished a source is added to the interest attaching to a chronicle of stirring events embracing a wide field of adventure.

It has not been the author's intention to write a memoir or history but rather, as he states, to retrace with his readers some portions of the journey of life and to illustrate the difficulties and dangers to which companions in arms have been exposed, in order that, if possible, their services and achievements may be more fully appreciated by the beneficiaries who are now enjoying the fruits of their heroism and sacrifices.

In the chapters devoted to Indian fighting the dispassionate judgment of an eye-witness to the terrible scenes described, which gives strength and authenticity to the narrative, should go far both to modify the views of unwise sentimentalists and temper the animosity awakened by many a barbarous massacre.

The book opens with a thoughtful retrospect of colonial life and character and the youthful impress made upon the author by a perusal of New England history, resulting in an adherence to the profession of arms as his chosen pursuit. The almost invariably hostile attitude of the Indians towards the white settlers is traced from the earliest period of American colonization, and the gradual occupation of the far West consequent to exploration and acquisition of new territory, together with the vicissitudes of frontier life and the hardships to which pioneer emigrants were subjected—these and many other incidents of the period are narrated with the clearness and fervor of an actor in the drama of national progress.

The period of the war is touched upon with comparative briefness. One personal episode at the beginning, modestly told, stands out and sounds probably a note of after success. He had raised some three or four thousand dollars which was devoted to recruiting a company of which he was chosen captain, and duly commissioned. The evening before the regiment left for the field the Adjutant-General of the State came from the governor and demanded the return of the captain's commission and acceptance of that of lieutenant instead. Many another would have thrown up the appointment in disgust; not so our author, who writes:—"As I had engaged in the service against the enemies of my country, I did not propose to abandon that service to engage in a contest with the governor of my state, however just my cause, though I certainly regarded the position he had taken as unwarranted, I, therefore, began my military career as a captain reduced to lieutenant."

After his severe wound at the battle of Chancellorsville, General Miles was obliged to remain away from the field for a time, but recovered sufficiently to take part in the autumn campaign of 1863 and that of the Wilderness the following year and again in the final

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\* *Personal Recollections and Observations of General Nelson A. Miles, U. S. Army.* Copiously illustrated with graphic pictures by Frederic Remington. The Werner Company, Chicago-New York. 1896.



campaign of '65. During the latter portion of this period he commanded the First Division of the Second Army Corps, and for a short time in Feb. 1865, the corps itself. The surviving members of Hancock's old corps will read with pleasure the glowing tribute to that splendid organization, the number of whose engagements inscribed upon its banners outnumbered that of any other corps of the army, and whose captured battle-flags outnumbered its engagements. The chapter devoted to the last scenes of the war notes that the first proposal for a surrender came to the general's own lines, though the culminating scenes were by accident shifted to another point.

When the Volunteer Army disbanded the author was commissioned colonel of the Fifth Infantry, with station at Fort Hays, Kansas, and thenceforward continued to serve west of the Missouri until the fall of 1890, a period of twenty-two years. "During this period," he writes, "I have been an interested witness of the transformation and marvellous development of that vast region. Within a quarter of a century following our great war a new empire has sprung into existence. What was at one time a vast desert plain, wilderness and mountain waste, has been transformed into a land of immeasurable resources, a realm rivalling in extent the empire of the Cæsars."

"Looking backward but a few years, I, myself, having witnessed all the processes intervening between the tepee and the town, am astonished at the change. In the weariness of the march, the loneliness of the camp, and the excitement of the fight, the soldier of the Western campaigns was not aware of the flood of energy behind him, whose barriers he was breaking and which followed instantly when he led the way."

Probably to most readers the interest of these valuable reminiscences will centre in the six years of Indian campaigns in which the writer was actively engaged. The territory covered by military operations extended from the region of the Yellowstone to Mexico and Texas, and the scenes enacted on this huge theatre are described with a grim fidelity to fact. The hazardous exploits performed, the sufferings from cold and hunger and the heroic conduct of the troops throughout a warfare in which all the Indian's implacable hatred and thirst for vengeance were constantly displayed, are narrated in a way to hold the reader's attention to the end.

Regarding the fate of the Indians, General Miles writes: "He was never destined to remain in the position of barring the way of a mighty civilization. The wrongs he has suffered are inexcusable and his destiny is one of the saddest in human history. He might have yielded most that he has lost and still have been treated fairly, still have had the promises made him fulfilled. But between him and all broken contracts and all changing policies, the soldier of the United States has been required to stand. That stand is now a matter of history. The result alone is seen."

Prominent as is the subject of the Indian and his subjugation and control, General Miles' story is by no means limited to this theme. He writes instructively of the "Arid Region and Irrigation," showing the almost marvellous achievements resulting from systematic and scientific effort at irrigation in reclaiming waste lands, also of "Transportation" and "California." Even remote Alaska and its unique people receive recognition in these extensive recollections, the same thought and observation being here as elsewhere discernible.

The handsome likeness of General Miles, which forms the frontispiece, and the many portraits of prominent generals and other companions in arms, together with those of Indian celebrities, lend additional interest to this sumptuous volume, which is further admirably illustrated by the graphic sketches of Mr. Frederic Remington.

The book is handsomely printed and the publishers have given it a dress quite in keeping with its distinguished character.

### Water-Supply, Chemical and Sanitary.\*

Professor Mason prefaces his work with the announcement that compilation must of necessity enter largely into his undertaking ; and that tabulations, with frequent references to the findings of other investigators, naturally form no small portion of the body of the text. He hopes that his book may prove of interest to classes of men widely separated in tastes and occupations : the physician, the hydraulic engineer, the water-analyst, and the general reader.

His hopes are certain of realization, for all classes named will find compactly drawn up and well classified, a mass of information heretofore diffused through many publications, and the conclusions deduced therefrom. A professional work, it is replete with interest for anyone who would be well-informed on matters of import to individuals as well as communities : the householder will find that he must not neglect his charcoal filter, and that artificial ice may be more impure than the natural ; the citizen, that danger accompanies sewage for many miles after its discharge into streams. Both will find that a thirteen per cent. increase of rainfall has followed increased care of forests in India. The residents of Washington, D. C., not long since, were greatly disturbed in the early morning hours by the discharge of high explosives in upper air with a view to obtaining rain, or an appropriation from the public treasury, possibly both : their annoyance would have been greater had they known that it was claimed that an impending rainstorm had been averted at Rome in 1539 by firing artillery in the direction of clouds which had already begun to drop their moisture.

In the general arrangement of the subject matter, the sanitary precedes the chemical and bacteriological. But the last two must be studied to understand the sanitary. For this reason it would have been preferable to have reversed the order of arrangement. How to make chemical analyses, how bacteriological examinations, the preferable methods, when one class, when the other, or both, is fully set forth. But when we undertake to state even generally the scope of this treatise, difficulty is experienced on account of the wealth of information before us.

The spread of disease through the agency of drinking water ; the different methods of filtration on large and small scales ; the artificial and natural purification of waters ; the impurities of rain, ice, and snow ; flowing water, affected or not by tides, and associated with rainfall and evaporation ; forest influences upon evaporation and water-supply ; the storage of waters, sedimentation reservoirs, the benefits following the covering of reservoirs ; ground water and driven wells ; deep water and artesian wells ; per capita daily supply and its diminution by use of meters without diminishing the proper use of water ; the action of water upon metals, including the prevention of boiler-scale ; analyses ; statistics ; effects upon fish, of contaminated waters ; suitable water for various industrial purposes ; what are polluting liquids ; the use of sea-water for street-watering, sewer flushing and other purposes. All these are but general headings, not one of which but is of interest and importance to professional men, students and general readers.

One or two paragraphs concern troops in the field. The proportions are given of a mixture, composed of fine clay, aluminum sulphide and calcium permanganate, proposed in 1873, for addition to the highly impure waters of the Gold Coast before their use by troops during the Ashantee war ; the mixture, however, did not act quickly enough for use on the march. Twenty-two years later, on another Ashantee expedition, filters were found no good, and drinking water was boiled. Professor Mason's work shows reliance upon

\* *Water Supply, Chemical and Sanitary*. (Considered principally from a sanitary standpoint.) By William P. Mason, Professor of Chemistry, Rensselaer Polytechnic Institute ; member of American Philosophical Society, American Chemical Society, American Water-works Association, New England Water-works Association, Franklin Institute, etc., etc. New York : John Wiley & Sons. London : Chapman & Hall, Limited. 1896. Pp. vii, 504.

the boiling of water to be well founded ; ordinary boiling for half an hour will destroy about 99 per cent. of all bacterial life, and that which remains is entirely harmless ; while boiling Seine water for but fifteen minutes removed about 95 per cent. of the bacteria found in it at its ordinary temperature.

Last but not least, a comprehensive table of contents is supplemented by more than a score of pages forming a copious index.

J. G. D. K.

### The Armies and Navies of the Present Day.\*

Since the English Government, about 1891, ceased the publication of much of the work of its Bureau of Military Information regarding foreign armies and navies, there has been no published, reliable source of such information available for the military student other than newspaper and periodical notes or his own travel and observation.

The Germans now propose to supply this lack by publishing a popular work under the title of "The Armies and Navies of the Present Day," in ten volumes, as follows :

- |                   |  |
|-------------------|--|
| 1. Germany.       | 7. Spain and Portugal.   |
| 2. France.        | 8. Sweden, Norway and Denmark.                                   |
| 3. Russia.        | 9. Turkey, Roumania, Bulgaria,<br>Greece, Servia and Montenegro. |
| 4. Austria.       | 10. Holland, Belgium and Switzerland.                            |
| 5. Italy.         |  |
| 6. Great Britain. |  |

If this publication proves successful the scheme will be extended to include other nations.

The writers are able and experienced professionals and include in their number some of the best known military writers of the present day, which gives the reader the comfortable assurance that his information is accurate and reliable.

It is observed that the English army will be described by a Lieut.-Col. of the English General Staff, whose name is however withheld.

The first volume, on Germany, has just appeared (Sept., 1896). The army is described by Gen. von Boguslawski ; the navy by Rear Admiral Aschenborn. There is also an additional chapter on the International Red Cross by Major von Straub.

Gen. Boguslawski begins with a short historical introduction followed by a presentation of the military laws of the empire and a description of all the essential principles of the military system, including universal military service, military sub-division of the country, peace and war strength of the army, two-year service with the colors, etc. Then follow the organization of the army proper, mobilization, interior administration of the various military units, arms, equipment and clothing of the different arms of service, etc.

Separate chapters are given to the Medical and Supply Departments, to military justice, to retirements and to pensions.

The chapter on tactical development in the three arms and the present tactics is of peculiar interest as coming from the pen of such an authority as Boguslawski. Apropos of this, the very latest army changes authorized by law will be found at the end of Boguslawski's work. The most important question involved is that of the fourth battalions. By the law of August 3, 1893, time of service in the infantry was reduced to two years and an average figure established for the "peace strength."

The shorter time for training recruits into efficient soldiers rendered it necessary to make instruction and drill more active and intense than ever before. The increased strength of organizations, by the increased strength of the army, was somewhat of a com-

\* *Die Heere und Flotten der Gegenwart, I. Deutschland.* Edited by Dr. J. von Pflugk-Hartung, Registrar of the Royal Privy State Archives in Berlin, etc. Published by Schall & Grund, Berlin, 1896.

pensation for the reduction in time allowance for training ; and further advantage was expected from the organization of fourth battalions for each regiment, which were intended for three purposes :

1. To provide for supernumerary recruits after filling up the other three battalions.
2. And more important, to relieve the other three battalions of reduction in strength by details for detached service and for what corresponds in our service to extra and special duty.
3. To act as depot battalions at mobilization, by reducing and hastening the work of receiving and getting the reserves into shape for the line of battle.

But these fourth battalions have proved very unsatisfactory. It is true they have rendered the assistance to the other battalions which was expected of them, but this has made them so weak that it has been found impossible to drill them properly and bring them to a proper state of efficiency for war service.

It has been and is, then, a pressing necessity to remove this obstacle to the fighting efficiency of the army.

A bill is now before the German Parliament to authorize every two of these fourth battalions to be combined into one ; every two such combined battalions to form a new regiment ; and every two such regiments in each army corps to form a new brigade. This can be done without changing the total peace strength ; and, with slight drafts from the other battalions, each of the combined battalions can be brought up to a strength of 500 men. The new regiments will have the same functions as the present fourth battalions. But they will do as much as and more than the old formation and be, at the same time, far more efficiently instructed as soldiers.

The proposed change will also be very much cheaper than the law of 1893 contemplated.

The conclusion to be drawn from all this, is, that the Germans believe there is a minimum limit of numbers for each unit, below which it is false economy to attempt or to expect thorough military efficiency.

The proposed bill contemplates that, beginning with April 1, 1897, the army shall be composed of infantry, 624 battalions ; cavalry, 465 squadrons ; field artillery, 494 batteries ; foot artillery, 37 battalions ; pioneers, 23 battalions ; railroad troops, 7 battalions ; train, 21 battalions.

The construction of the nickel steel field-gun adopted in 1891 is illustrated and described—as also the shovel brake used on field carriages. It is a pleasure to note that the German trooper is no longer clamped to his horse by an elaborate carbine case passing over his right thigh—but that the American carbine boot, carried vertically behind the right side of the cante, has recently been adopted.

The Germans still cling to the iron ponton ; an error they would rue, should they ever attempt to cross a river in the face of American riflemen. In slinging the knapsack, however, the United States might do worse than adopt the German method, which is scientifically correct. The German overcoat too is better than ours. Ours gives but little warmth below the hips and the cape is of no particular use except as a head covering. The German coat has no cape, but is very long and soft and has a very high collar with a flap buttoning across the chin. With the German overcoat it is unnecessary to carry a blanket on the back.

It is of interest to note the intrenching tools carried not only by pioneers, but also by all infantry and other troops. The American disregard of this equipment is not easy to understand in view of the experience of our own wars and of other nations in more recent wars.

The Colonial forces in German Africa are also described, the latest army appropriations



given, and the whole is fitly concluded by a good map of the locations of the troops throughout Germany and on the frontiers.

The index is complete and detailed.

The Navy is treated in much the same method as the Army, by Admiral Aschenborn. Historical introduction is followed by description of legal status, details of organization, of personnel and of matériel. Systems of ship construction are described; then details of interior economy and discipline; administration and supply; uniform and equipment.

The chapter on the Red Cross describes its origin, development and spread, with details of its administration and of the work accomplished by it.

The volume is generously illustrated but, from an artistic point of view, the illustrations are not of the high grade to be expected from the wording of the preface. Some of the colored prints could not be improved on but the plates illustrating full length uniforms are poor. The black and white cuts are fair and the photographs very good. For a popular work such as this is intended to be the illustrations are however of great assistance and of much value.

The frontispiece of the Kaiser depicts that genial monarch as a hard-faced despot with a moustache *à la* Victor Emmanuel. The other portraits are much better and very satisfactory. The cuts of rifles, guns and projectiles are clear and valuable, but one misses, in general, the high grade illustrations of similar American publications.

It should not be forgotten that this is a popular work and, as such, much technical detail, useful only to special military students, has been omitted. But it is still remarkably complete. The indexing is very complete and the work is easy of reference and is invaluable as an up-to-date record of the armed strength of Germany.

It is a final satisfaction to note that it is the intention of the editor to issue new and corrected editions every five years, provided his labors meet with sufficient encouragement.

T. A. BINGHAM.

## Publisher's Department.

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**THE Miller Lamp** is an important feature in army life. While gas and electric lights rule in nearly every town and village in the United States, the dwellers at the military posts and stations throughout the land have to be contented without gas and electric light illumination. Even military posts near the most populous cities in the Union have oil illumination only. What wonder then that the dwellers at these posts try to secure the best lights obtainable. It seems that the majority of them have come to the conclusion that the "Miller Lamp," manufactured by Edward Miller & Co., Meriden, Conn., and sold by this firm at their stores in New York and Boston fills the bill.

It is found that it furnishes a light unexcelled by any other lamp, and the best device for lighting without removing the chimney. It has the most perfect flame and the best device for raising and lowering the wick. It has the simplest and best wickholder, and in short, it is the most durable, simple and scientific lamp ever offered for sale. A descriptive and illustrated catalogue will be sent by the firm upon application. Selections can be made therefrom and it will be found that the prices are very reasonable compared with those of other manufacturers.

\* \* \*

**The E. L. Anderson Distilling Co.**, at Newport, Ky., desires to remind the members of the service throughout the country that their business is still conducted at the old stand, and that they are ready at all times, as they have been heretofore, to give mail orders prompt attention.

It is a well-known fact that the quality and flavor of their liquors has always been exceptional and this fact has been appreciated.

Go where you will, in every town and hamlet throughout the country the company's liquors are to be found. Their price lists, sent to all who ask for them, show that they sell good goods at low prices.

Orders received from military clubs at the different posts and stations will be attended to with dispatch and so will be all orders received from any individual member of the service.

\* \* \*

**The Bicycle for Military Use** is now an assured success in the United States. It has just been put to a severe test in the Far West, and has shown beyond doubt that,

however problematical may be its advantages in actual battle, it is already of vast practical utility in various other purposes of military necessity. This test was made by a detachment of eight men from the 25th Infantry at Fort Missoula and was under the command of Lieutenant Moss. The men chosen were ordinary riders and the bicycles were the regular output of one of the big standard concerns of the east (**A. G. Spalding & Bros.** New York and Chicago). The test was to be 1000 miles over common mountain roads, with the riders equipped for such exigencies as might befall them in a scouting or messenger run through a hostile country. Besides 130 lb. of rations the party carried a complete rough camping outfit—blankets, rifles, thirty rounds of ammunition to each man, extra tires, and all the paraphernalia of a forced march. The average weight of the wheels packed was  $77\frac{1}{2}$  lb. The weight of wheel and rider ranged from 272 lb. to 202 lb. each. The result of the march was a surprise even to the strongest supporters of the bicycle. Lieutenant Moss reported that both soldiers and wheels had stood the journey remarkably well. The test was made as thoroughly as possible and under all conditions; they had ridden in all kinds of weather, through mud, sand, and dust, and scarcely a hitch occurred.—*Army and Navy Gazette, London.*

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**Atlanta Exposition, 1895.** CRANE BROTHERS, WESTFIELD, MASS., BANK-LEDGER, RECORD, AND "ALL LINEN" PAPERS—GOLD MEDAL. The award of the gold medal was made to the firm of Crane Bros. for the general quality of their papers, their remarkable freedom from imperfection of any kind, and the evident care and skill of their manufacture. They were pronounced to be the most finely woven papers at the exposition and the high award made was granted unanimously. The old days of the paper factory, when almost any grade found a market, have gone by, and the perfection of machinery for all uses has made the attainment of the highest possible grade a necessity if the makers desire to remain in the markets of the world. The great legal and commercial transactions of the present demand a record that shall be permanent, and the paper that meets the purpose must be tough, strong, durable, able to stand a severe strain of fibre, and it must be perfectly sized as well. This last is of the greatest importance and depends, in every paper mill, upon the scientific knowledge brought to bear directly upon the processes of manufacture. In the Crane papers, the quality of sizing evidences that the chemical action of the inks in commercial use upon the gluten and gelatine is thoroughly understood and provided for. The success attained by their papers has only been achieved after years of patient labor and experiment but the result is an abundant reward for its cost. To-day, the trade mark of the Crane Bros. is known the world over, and their papers are endorsed and used by the leading stationers and blank book manufacturers of the country.

\* \* \*

### **Small Steamboats. Why Some are So Much Better than Others.**

Referring to small craft in particular (25 to 150 feet) it will be found that the most suc-

cessful are fitted with modern Marine Steam Machinery built for that particular hull by some *one* shop.

The builder of the *complete* Machinery "outfit" (making it all and not subletting parts of the job to various shops) furnishes the boat builder with reliable details as to weights, and scale drawings showing dimensions and arrangement of the important parts, on what amounts to the same basis that is the rule in constructing large vessels, all of which is instrumental in producing a perfect craft. Thus the various parts, connections and fittings are suited to each other, and to the hull, all in *exact* proportion to the power, steam pressure, strain and maximum work which the boat may be called upon to perform.

Even boat builders and engineers of experience would, on investigation, be surprised to learn how few concerns there are who actually *build* the "complete outfit"; many subletting the work among different shops.

For the entire district tributary to Chicago, including the Mississippi Valley, there is but one company (**Marine Iron Works, Chicago**) who build *all* of the described machinery outfit, and making it their exclusive specialty, fully cover the line referred to, in propeller and paddle-wheel Machinery, condensing or non-condensing, as may be needed.

In the work described, the demand is so limited from any one district, that those giving it their entire attention, as is the case with the company named, must reach to distant points in order to justify the outlay required for facilities, patterns and equipment that are needed to keep pace with the varying requirements. It is manifest that each job has to be built to order to meet such needs, and that the designer and builder of the Machinery outfit be experienced in the construction and operation of steam craft.

\* \* \*

**The Seed is the Vital Thing.** Planting must be begun right, else no amount of cultivation or fertilizer can prevent the crop being a failure. The first step is the selection of the seed. Do not take any risks here. Get seeds that you can depend upon—seeds that are fresh, that have a reputation behind them. The most reliable seeds grown in this country are Ferry's Seeds. Wherever seeds are sown the name of **D. M. Ferry & Co.**, of Detroit, Mich., is a guarantee of quality and freshness. The greatest care and strictest caution are exercised in the growing, selection, packing and distribution of their seeds. Not only must they be fresh, but they must be true to name.

On a par with the quality of the seeds is Ferry's Seed Annual for 1897, the most comprehensive and valuable book of the kind ever printed. Every planter, large and small, should get, read and digest this book before planting a single seed. It is free to all who address the firm as above.

\* \* \*

**Malt Nutrine and Beer.**—It is a well-known fact that this health-giving liquid fluid, manufactured by the Anheuser-Busch Brewing Association of St. Louis, has become



a necessary article in most every household in the land. It has been found invaluable to those unable to take solid food, and it has given strength to those in need of it. No wonder then that this nutritive tonic has been in greater demand during the past year than ever before.

Of course, everybody has heard of the Anheuser-Busch Brewing Association as the manufacturers of the famous beer bearing their name. A gold medal has been awarded this association at every World's Fair during the past decade, the product of the brewery having been found to be without adulteration, and of superior quality. Of bottled beer there is a great variety. A handsomely illustrated colored booklet, furnished, upon application, by the Anheuser-Busch Brewing Association, will give the necessary information.

## Announcement.

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THE BOARD OF AWARD selected to consider the merits of the essays submitted in competition for the prize of 1896, have rendered their report, awarding the prize of the Institution to Captain J. S. Pettit, 1st U. S. Infantry, for the best essay on "The Proper Military Instruction of our Officers; the method to be employed, its scope and full development."

The essays of 1st Lieutenant R. G. Hill, 20th U. S. Infantry, and 2d Lieutenant L. C. Scherer, 5th U. S. Cavalry, received honorable mention.

# The Military Service Institution.

## *President.*

Lieut.-General JOHN M. SCHOFIELD, U. S. Army.

## *Resident Vice-Presidents.*

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KNIGHT, J. G. D., Major Corps Engineers.  
MILLS, S. C., Capt. 12th U. S. Infantry, A. D. C.  
MYRICK, J. A., Major 5th U. S. Artillery.  
PENNINGTON, A. C. M., Lt. Col. 4th U. S. Art. Col.

### *Term ending 1899.*

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PARKER, JAMES, Capt. 4th U. S. Cavalry.  
PATTEN, W. S., Major O. M. Dept.  
PHIPPS, F. H., Major Ord. Dept.  
WARD, THOS., Lieut.-Col. Adj. Gen'l's Dept.  
WEBB, A. S., Bvt. Major-General, (late) U. S. A.

### *Term ending 1897.*

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Col. CAREY.  
(Vacancy.)

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## *Library Committee.*

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## *Publication Committee.*

General BRECK, Capt. EDMUNDS, and Lieut. BUSH.

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(In the order of their establishment.)

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### *Corresponding Secretary.*

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Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"An Entrance Fee of Five Dollars (\$5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership and on the first day of each calendar year, thereafter, a sum of not less than *Two Dollars* (\$2) shall be paid as annual dues. Annual dues commence on January 1st in each year."

**NOTE.**—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor. Yearly dues (\$2.00) include Journal.

Changes of address should be reported promptly.



# Prize Essay—1897.

I.—The following Resolution of Council is published for the information of all concerned :

*Resolved*, That a Prize of a Gold Medal, together with \$100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and \$50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September 1, 1897*. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.

In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention ; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1896, for the Prize Essay of 1897, is

*“BASED ON PRESENT CONDITIONS AND PAST EXPERIENCES, HOW SHOULD OUR VOLUNTEER ARMIES BE RAISED, ORGANIZED, TRAINED AND MOBILIZED FOR FUTURE WARS.”*

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1897 are :

GENERAL WESLEY MERRITT,  
GOVERNOR U. A. WOODBURY,  
COLONEL H. W. CLOSSON.

JAMES FORNANCE,  
*Secretary.*

GOVERNOR'S ISLAND,  
Nov. 1, 1896.



## Announcement.

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THE Members and Associate Members of the Institution are respectfully informed that the biennial general meeting, called for by Article VI. of the Constitution, will be held at Governor's Island, N. Y. H., on the 13th day of January, 1897.

JOURNAL  
OF  
THE MILITARY SERVICE INSTITUTION  
OF THE  
UNITED STATES.

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*"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."*—SHERMAN.

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THE LYCEUM AT FORT AGAWAM.

BY CAPTAIN EBEN SWIFT, 5TH U. S. CAVALRY.

"Good lads, how do ye both?"

"As the indifferent children of the earth."

"On fortune's cap we are not the very button."

HAMLET.

A NATION devoted to the arts of peace cares little for the possession of an ideal army. Some motive or interest, more powerful than any that now appeals to the occupants of this hemisphere, is necessary. We envy no nation its wealth or limiting boundaries, we have no revenge to gratify, no creed to uphold, no allies to defend, and many of our wise men believe that anarchy may be exorcised by injunction. To raise a model army, with officers well trained in their art, we require new laws and appropriations of money for new uses, and a congress and a people deeply interested in its welfare. We need a prospective field of usefulness much nearer than anything now in view. These things we cannot expect.

But although this is true, it will never be accepted as an excuse for inefficiency in time of need. It is a fact that the country looks upon the army as a nucleus upon which to rally in the remote possibility of war; its officers are supposed to be a body of men trained in the profession of arms, fully able to undertake the organization, drill and instruction of new levies; any one of them would be likely to act as a staff officer, called upon

to apply the experience of past wars and to advise in all the intricate and minute details of a modern army. How pitiful that trust is most of us know full well. How to justify it is the object of this discussion.

Some armies have been improved only by defeat. In others the reaction after a successful war is often for the worse unless there is prospect of another war. Thirty years of peace frequently fixes many customs and traditions in an army that can only be uprooted by a new and terrible emergency. When that time comes we may be sure that other systems of peace training will be adopted, and that the new will only flourish if built upon the ruins of the old.

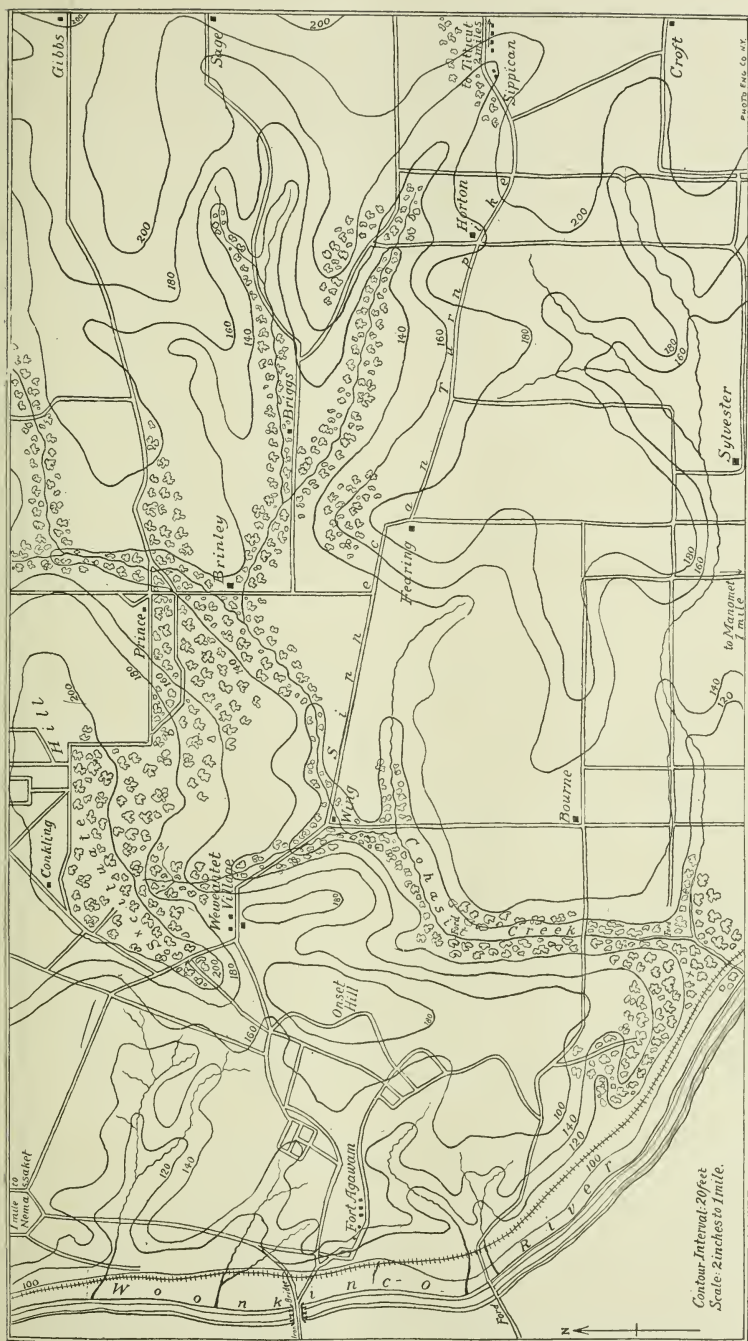
Criticism is not a pleasant task, but my thoughts are crowded with dreams of another day when I have imagined myself in a paradise for soldiers, where all things work smoothly to the single end of military proficiency, and all men seek "the bubble" without the vexing cares or weary routine of ordinary garrison life. To that blessed clime, where ignorance doth not enter and where tradition is a blank, I ask you now to follow me, over many leagues of space and time, to Fort Agawam on the borderland of our most distant possession.

Imagine the post garrisoned by a regiment of infantry, a squadron of cavalry, a battery of field artillery. Not far away a powerful neighbor had made many warlike preparations; a loyal population claimed protection; many believed that war was close at hand. Distance and difficulties of communication made it necessary to allow the Colonel to prepare his command in his own way for the coming emergency. He was a progressive man, with no failures in his past and a serene trust in the future. Under the heading of "The Lyceum at Fort Agawam" I will endeavor to outline all the methods introduced by him in the training of his officers without the presence of troops.

#### THE MAP.

Every day at an early hour the officers were assembled at the post headquarters, and on this occasion the Colonel rapped for silence and spoke as follows:—

Any satisfactory military study must be based on the possession of a map of some kind. The first thought would naturally be to use some of the numerous tactical studies published in other countries with maps of foreign ground. This plan is aban-





done after a careful examination. The best of those translated into English are too ambitious for our use, dealing like those of Moltke, Verdy, Gizycki and others with operations of armies and divisions. It is true that numerous copyists of these distinguished soldiers and writers have appeared who have not failed to discover the need for elementary studies on the same plan. Unfortunately, those that have appeared in English cannot be recommended. Some adopt an ideal terrain, involving numerous absurdities; others are so entirely foreign to anything we would accept in this country that they could not be considered; others propose problems but give no solution. It is above all essential that we make a study of our own conditions and apply them to our own ground. We will therefore begin our course of military instruction of officers by the preparation of a suitable map. It is not expected that we will get an elegant piece of topographical work or an entirely accurate survey. The idea is to produce a map in sufficient detail and on a large enough scale to show the tactical capabilities of the ground in the section in which we will begin our work.

We have now a small map on a scale of one-half inch to the mile, based on the Government survey. The map is fairly accurate on section lines, but not otherwise so. Some of the roads are not correctly shown, others do not appear at all. The limits of woods, farms and fences, the names of owners, etc., are entirely wanting, and there are no contours. We know the geographical position of the flag-staff, the variation of the compass, and the position of many of the monuments of the Government survey. This will furnish a sufficient framework for the map and a triangulation will not be necessary.

The country to be represented will be an area eight miles long and four and a half miles wide, at the east of the post. It will be divided into sections which will be bounded by natural lines as far as possible. An officer will be assigned to each section.

The plan to be followed will be for each officer to collect all available data within his section upon a skeleton map drawn to a scale of two inches to one mile. The necessary additional details will then be supplied by a gradual filling-in of the notes of special reconnaissances, omitting contours in the first instance. To put in the contours, several lines of accurate levels will be run throughout the district to be represented. The stations of

these lines will be bench-marks from which the officers will calculate the secondary levels with the hand-level. A single officer will be detailed to plat the completed notes on a "progress map" showing the entire district. If wide differences are discovered in connecting the surveys, the errors will be sought for and corrected.

The instrument to be used will be the "field sketching board," which is best described as a plane-table carried on the left forearm. It is of simple construction and can be made at the post.

After the work is finished a tracing will be made and blue-prints will be furnished to each officer and non-commissioned officer. An additional map will then be provided by enlarging the two-inch map to a scale of twelve inches to a mile for use in the midwinter exercises to be described hereafter.

It is not intended to prescribe here in detail the manner in which the officers will familiarize themselves with the field sketching board, as it is believed that the manuals are sufficiently explicit and that by confining themselves to the same piece of ground they will finally be able to work it up in satisfactory shape.

Without prescribing too minutely the details to be followed in making the map, I will only say that all roads and paths should be classified with reference to their use in a military sense. Thus macadamized roads should appear differently from country roads on which troops could not move so freely or on so broad a front; paths which will not accommodate wheeled vehicles should be shown differently from either.

Captains will not be available for this work. It will be performed by the lieutenants in a class under the direction of a field officer. We will have nearly one officer to each square mile of country, which is not a very heavy task, particularly when it is insisted that extra care in "finishing" is not desirable. A skilled surveyor would count on doing his share of this work in three days; unskilled but well-educated men should be able to do it in a little greater time.

This subject is placed after drill and before other work for many reasons beside the necessity of beginning with a good map. The making of sketches will be a part of all future exercises with troops so that the experience here gained may then be used each day. All map-work will be filed with a view to the constant improvement and correction of our "progress map." In future seasons the process of mapping in other directions will go

on and the area thus made available for our operations will be constantly extended.

The importance of military sketching is greater in this country than in other civilized countries where every foot of ground is well mapped. It gives valuable practice which can be utilized in reading and understanding all maps. It is a brief and graphic way of recording information. It forces you to give that minute study to ground which is necessary in handling troops.

#### METHODS OF INSTRUCTION.

The map was finished toward the end of September. The lyceum was to begin on October 15 and continue until April. About September 30th, the Colonel assembled the officers and spoke as follows :

With the beginning of the lyceum course a kind and quality of study that is new in our service will be inaugurated. We have now finished all the drills and theoretical studies called for by previous regulations, and you should be reasonably familiar with everything so taught and able to consult the proper references when you wish to refresh your memory on any point.

In the instruction of officers several methods have been recommended and employed. They differ so widely that a brief explanation of each will be given.

The first is called the "cramming" or "booking" system of study. It consists of daily recitations, or periodical examinations, or both recitations and examinations, on certain excellent text-books which are adopted as a standard. It results naturally that the test of proficiency is that of ability to answer questions taken from the books. A defect of the system is apparent when it is seen that a series of perfect daily recitations may be followed in a short time by a deficient examination. The knowledge so obtained is deceptive. It develops the memory and not the judgment. The false basis on which it rests may be shown in every trade and calling. From books you never learn to speak a language. To start the band to play, much more than a study of music is necessary. An officer weak at drill and instruction but brilliant in the book is one of our anomalies. Information so easily acquired oozes away as rapidly as it came, and the prime object of keeping in touch with your profession at all times is defeated.

A second method, which in truth is no method at all, may

be called a "pounding" system. It was the basis of the instruction of our volunteers during the Civil War. Without previous instruction and without knowing where to get it, they rushed into the field and learned their business by hard knocks and rough experience. This developed a magnificent army but it was expensive. It prolonged the war to four years, cost the Northern States five thousand millions of dollars, and gave a death-roll of more than a third of a million of their best and bravest men. What it cost the Southern States will never be known. An approval of the "pounding" method means a cessation of all military preparation and study in time of peace. It leaves the barn-door open and trusts to luck that the thief may be caught. It hopes to fool the God of Battles by talk of what Yankee Doodle has done in the past and what he will do again if he ever gets mad. It ignores the foreign sneer that we are a great nation only by sufferance.

The third method is called the "applicatory" system.

An examination of the other methods reveals to us the greatest difficulty that we encounter in military study. To bridge the chasm between practice and theory was long considered impracticable in our profession, although so easy in others. The error came from the mistaken idea that the only way to learn the methods of war was to practice war itself.

The "applicatory" method of teaching consists in working out tactical schemes which are based on probable or real military situations. Such situations are not hard to imagine and do not need the exciting incidents of war to make them useful for a military student. Having studied the theory we can apply it to various concrete cases and develop our ideas just as we would in practice. The whole process is greatly simplified when we are able to make our applications on familiar ground with the aid of a good map.

Much of the value of the system consists in the manner in which the case is presented, the care with which the books of reference are studied and consulted, and lastly in the number of cases that are considered. In the last point it partially resembles the second method where knowledge was gained by experience alone; the greater the experience the greater the knowledge gained. But here each experience is supplemented by discussion, criticism and study. In the course of time the variety of experience will be brought to resemble that obtained in a real



campaign. In a real campaign you have not time to digest your experience, events follow each other too rapidly and your mind is diverted by things that shake the very temple of the soul. In a sham campaign these conditions do not exist, but they say that the habit of the manœuvre ground has often been found to take the place of courage in war.

#### THE LYCEUM COURSE.

The lyceum course of twenty-four weeks will be divided into three periods of eight weeks each. The first period is devoted to "written exercises," the second to map manœuvres, commonly called "kriegsspiel," and the third is devoted to studies of military history. One session in each week will be held and it is expected that the intervening time will be used in preparation. For this purpose ample notice of the character of future exercises will be given.

It will be found that some disadvantage is encountered from the absence of field service manuals. However, much that is essential will be found in the drill-books, in the pamphlet on Troops in Campaign and in the authorized text-books. The subject of orders is not sufficiently treated therein, and therefore it is deemed appropriate to give a full consideration to this important element of education.

#### THE ART OF COMMAND. ORDERS.

The whole fabric of the art of command rests on the issue of orders. It is not enough that a leader be self-reliant, experienced and brave; his subordinates loyal and skillful; his troops well-disciplined and filled with enthusiasm for their cause. All this was within reach of the greatest master of warfare that the world has known, but his best plans often failed or came near disaster. Napoleon excelled in clear and vigorous language, but something was wanting. His orders to Bernadotte previous to the battles of Jena and Auerstädt, to Berthier at the beginning of the Eckmühl campaign, to Ney at Dennewitz and Bautzen, to the marshals following up the victory of Dresden, to Grouchy at Ligny, can now be read in the light of history and of the statements of participants. Not all of his failures can be blamed upon subordinates whose instructions left no room for doubt; not all of his good fortune was due to a generous performance of his own well-expressed commands.

Nor can we seek for models in our own military history.

We have seen that Grant's repeated orders did not bring a division which was six miles away into the fight at Shiloh. The inactivity of Patterson in the Bull Run campaign was caused by the defective orders sent him. Hood explains the escape of a Federal army at Spring Hill by the fact that his orders to attack were not obeyed. The opportunity to destroy a portion of McClellan's army at Fair Oaks seems to have been missed because of the confused plans and orders of the Confederate commander. The great disaster at Chickamauga was caused by a badly worded order. Controversies on these subjects fill many pages of our records.

Strange ideas on the subject of military orders existed during the Civil War among officers who were supposed to represent the best trained element of our army. The orders at that time were often filled with useless details, ridiculous suggestions and unwarranted interference with subordinates.

The order for the advance of the Union army before the first Bull Run warned the army that three things were not pardonable in any commander. 1st. To come upon a battery or breastwork without a knowledge of its position. 2d. To be surprised. 3d. To fall back. This order, which directed a movement of over 35,000 men, prescribed that advanced guards, videttes and flankers were to be used. Brigades were told to sustain themselves as long as possible before asking help of others. The order gave directions as to manner of attacking a battery, and told how camp-kettles and mess-pans were to be carried.

The order of the Confederate commander for the attack on Grant's army at Pittsburg Landing required some hours for preparation, and now occupies about three pages of the Rebellion Records. It reminded one major-general, who, by the way, was himself the author of a system of tactics, that he must "make a proper distribution of the artillery along the line of battle, remembering that the rifle-guns are of long range, and should be placed in commanding positions in rear of his infantry, to fire mainly upon reserves and the second line of the enemy, but occasionally will be directed on his batteries and heads of columns." Another major-general, a veteran of twenty-five years service, was told how to form his regiments in line, but was permitted to place his artillery to suit himself, possibly in deference to the fact that his battery had saved the day at Buena Vista fourteen years before. The order provided for a number of detachments,

for camp guards, for repairs of bridges and roads, and closed with an appeal to the patriotism of the troops and enjoined them to obey orders, not to waste ammunition, to fire slowly, at a mark, and to do much work with the bayonet.

The will of a chief is conveyed to his subordinates in various ways. The higher his position, the more general in character will his orders be. At the beginning of operations, and from time to time thereafter, the plans and intentions of the supreme authority would be issued in the form of Letters of Instructions. They would regulate movements over a large area during a considerable time. In this way General Grant directed a million men over an area half as large as Europe, from his headquarters at City Point. His letters and telegrams were of the most general character and prescribed little else than the general objective of the hostile armies and concert of action in attacking them.

It seems appropriate that directions of the headquarters of an army marching on several roads, covering the dispositions for several days at a time, should be issued in the same way, although no uniform practice obtains. General Sherman's Orders, from the Headquarters of the Military Division of the Mississippi in his marches from Chattanooga to Atlanta and beyond, were almost too general to be called orders, although designated as such. Of the same character were the circulars issued by General Meade before the battle of Gettysburg.

As soon as it becomes necessary to prescribe matters of detail, orders are issued of a more precise form. They would, for instance, be issued to a command marching on a single road. It would be necessary to regulate the size of the different fractions of the command, the task of each, the sequence in which they take the road, and the hours of starting. It is to this kind of an order, to which I now ask your attention, because it will contain all the essential points of every field order.

Orders are general or special, for regimental and all larger commands; for small units or commands they are simply called orders. The commanders of the several fractions would use the terms Detachment Orders, Advance Guard Orders, Rear Guard Orders, depending on the character of the duty.

All orders, not directly concerned with the movement in hand, should be issued separately. The practice of mixing up orders for every conceivable detail in service with the order for the movement of troops was a common thing at one time in our

late war. Some of the orders of Chanzy in 1871 read like the army column of a newspaper. The written order is the rule particularly with large commands. Verbal orders should be written down when dictated to persons designated to receive them ;— when sent by messenger verbal orders should contain but a single well determined point.

Orders for a small command as well as those for a large command follow an invariable model. The idea is to group all information in such a way that the eye will catch the same thing at the same place always, and thus you lessen the danger of leaving something unprovided for. As soon as you have learned to issue orders with an absolute certainty of forgetting nothing, then you may dispense with forms or vary them to suit your fancy.

The usual form of an order is something as follows :—

*The Caption.* At the beginning is given the official designation of the leader's command, the place of issue, the date and often the hour and minute.

The date may be abbreviated in the usual way, thus, 11-20-95, indicating the eleventh month and twentieth day of the month of the year 1895. In naming a night mention both days, thus, Night 19/20 November. The hour and minute are written in railway fashion, thus, 9.15 A. M. The words noon and midnight should be written.

The kind of an order and its serial number are also stated.

*The Body of the Order* is divided into numbered paragraphs without headings :

I., contains information of the enemy and so much of the general situation as it would be desirable for the subordinates to know. The first might be given in some such way as this : " From reports received it seems probable that the enemy intends such a move," or " The enemy appears to be in such a position." This statement, to be of value, requires a complete system of reports, a free communication with all the fractions of a command, and an efficient service of information. From the fact that it was omitted from some of the most important orders of our last war we are led to the conclusion that scouting and reconnaissance were often defective, and also that the peculiar character of the theatre of operations made it impossible to locate the enemy until he was actually encountered. Even in such a case it would seem that the ideas of the commander, however vague they might be, would deserve a place in the order.



II., contains so much of the general plan as may be considered necessary for proper coöperation of all parts of the command. As an illustration of the necessity for these provisions I will refer you to the numerous cases where orders are based on incorrect notions of the position of the enemy, in which case the subordinate may be justified in disobeying the most positive order. One of the points of contention in the Fitz John Porter case was that the orders of General Pope were based on an erroneous idea of the enemy and the claim was made that the officer performed a great service in disobeying the order. At the battle of Wörth the orders of the Crown Prince, to break off the action, were disobeyed because the commanders on the field thought the fight had progressed too far to make such a thing advisable.

III., contains dispositions to be taken for carrying out the second paragraph, and the tasks assigned to each of the several fractions of the command. In an attack the most important dispositions would be given first, followed by others of minor importance; in a march we would begin with the most advanced troops, following with others on the order of their places on the road. To avoid the delay and confusion arising from a large number of troops arriving at one place of assembly, it is usual to designate an "initial point" or a place which a certain part of the column will leave at a designated time. The troops may then calculate the correct time when they will have to leave their camps to take their proper place in column.

IV., contains all necessary instructions about the train, care being taken to keep it where it will not interfere with troops or be involved in the confusion of battle.

V., gives the place of the commander or the place where reports should be sent.

*The Margin* should be ruled to include a half to one-third of the sheet of paper, and contain a statement of the component parts of the command, as well as its subdivision into fractions for protection, information or for various missions.

In naming bodies of troops ordinary abbreviations will be used. In naming units from which a portion is to be excluded the unit should be named and the word "less" appended (for instance, 1st Cavalry, less 1 squadron). If more than half the unit is detached, it is sufficient to name the troops concerned.

*The Ending* should give the name of the officer by whose

authority the order was issued. A statement is also appended to show how the order was communicated to the troops.

There is much to be avoided in an order; explanations, apologies and conjectures are a sign of weakness in a commander; interference with subordinates is unwise when they know their duties and have as good opportunities for seeing as yourself; make no provision for a retreat in an order for an advance; do not attempt to provide for events that may never occur and that no man can foresee; beware of all ambiguous forms of expression, such as the words "before," "behind," "forward," "rear," "this side," "that side," "right," "left," "great," "little." The compass bearing with reference to known points is the best way to designate a point that is not on your map. A road is given by the names of several of its prominent landmarks.

Let all responsibility be clearly placed or boldly assumed. Cultivate a plain style and short sentences.

#### MESSAGES, DISPATCHES, REPORTS.

A commander's knowledge of the situation is gained and his decisions are formed, largely by the messages he receives from the front. These messages are written on a message blank of size to fit, when once folded, an envelope furnished for the purpose. An inspection of the blank and envelope renders a description unnecessary, except to explain that the heading "Sending Detachment" should be filled in with the name of the body of troops with which the writer is on duty, as Picket of 1st Company 20th Regiment of Infantry, or Officers' patrol 6th Cavalry.

The address is written briefly as, "To General Sherman." The signature should be the writer's surname and rank.

For staff purposes copying apparatus is provided. It is usual not to completely close the envelope in order that commanders along the line of march may read its contents. The orderly retains the envelope.

I use the word "message" in preference to "report" which is generally employed in this country, so as to distinguish between brief communications which pass from one part to another of an army on service, and the more elaborate history of the operations prepared under cover, at greater leisure, giving a complete narrative of the campaign or battle. Hence it is more correct to say that a patrol sends a message than that it renders a report. A

dispatch is a brief narrative of events, more detailed than a message and less so than a report. It is usually sent immediately after any important events, to higher authority.

The message, in its brevity, clearness and freedom from official forms, resembles an order or a telegram. It may even contain an order when sent to a subordinate. The message may therefore take the place of reports from the front and of orders from the rear.

The utmost care should be observed in its preparation, remembering that *facts* are wanted and that they must be clearly separated from what is heard or surmised.

Our rebellion records are full of stories of overwhelming forces of the enemy, of uniform valor and victory on the side of the writer and of indiscriminate praise of subordinates. This tendency to magnify the size of the enemy, to call a defeat a victory, and to award praise where it is not justly due, is only natural but should be strongly repressed. The information thus obtained is valueless to a commander, and every willfully false report should be treated as a crime.

#### WRITTEN EXERCISES.

On the 15th of October the officers were again assembled and the Colonel opened the session with the following remarks :

Written exercises are solved indoors with the aid of a map and writing materials. The problem is either dictated or a copy will be given to each officer. For convenience the form of all solutions will be fixed by definite rules.

The questions will be simple and will require a study of the map and the usual conditions of service. They will be practically the questions that you would be called to solve in service, and would only lack the absorbing interest that would be given them when an officer's reputation, honor and life depend upon the proper answer. By dealing with them in this methodical way you will have an early experience of some of the difficulties you will encounter in war, and you will be able to form a habit of meeting them without doubt or dismay. A great soldier has confessed to us that it was not genius that revealed to him the sudden and unerring decisions that so often astonished the world ; it was long and patient study. So when you are given a problem let me advise you to read and reread it many times, until you find it well fixed in your mind, and then many of the snares and pitfalls will disappear.

This work will nearly always contain an issue of orders, the sending of messages and reports, and the reasons for all decisions. After this has been worked out for a given hour in the progress of some military operation, the time may be moved ahead to another hour of the day, when new conditions will be presented.

Military situations can be shown by tracings from the map, in which the positions of bodies of troops in various formations will appear. Thus the written exercise may take the form of a connected military movement, or a history of the phases of an imaginary campaign.

Recall if you please some of your experiences in tactical exercises with troops in the open. You have noticed that indecision and faulty dispositions were often the rule. You and others have felt all the sentiments of anger and despair of good soldiers put in false and unreal positions, which you have been powerless to improve and the true error of which you could not see. Of only one thing were you sure, and that was, that from the moment you left the drill ground you lost the indelible mark that should stamp the manœuvres of regular troops. You noticed from the listless and indifferent manner of the men that they too were not deceived. They recognized at once the difficulties of their leaders, which were shown by vacillation, empty repetitions and undue deference to the advice of subordinates. Many officers feel that they have not gathered anything useful from these lessons, and they are too apt to accept the idea of those who laugh at it all and call it the "picnic" method of instruction. At the same time they feel like apologizing to the audience for their part in a military scheme where grim visaged war did smooth his ruffled front and sport in cap and motley. If any one here has had such an experience, I beg him to believe that it was due to lack of preparation and the right sort of study. If he had been given time and opportunity to work out all the details he would have reached a better result.

The written exercise is placed at the beginning of the lyceum course because it gives an abundance of time in which to work out the military questions involved; it excludes every matter which would tend to divert the untrained mind from this particular subject; it gives a chance to decide upon the best and clearest language; it gives an opportunity for full criticism and discussion. The written exercise is therefore an excellent pre-



liminary to the issue of verbal orders and the rendering of prompt and rapid decisions.

The first eight sessions of the lyceum course will then be devoted to a solution of eight problems. The chief point in each case will be to obtain a written order which would be the result of all the studies of the commander and would indicate the manner of execution of his task. In each problem the body of troops under consideration will be a detachment of all arms, consisting of the full garrison of this post with such special troops as may be required by the conditions of the problem. All units are at full war strength. In the first five problems the enemy will be supposed to be at a distance of one day's march; in the last three problems he will be supposed to be near. The time allowed for the solution will be four hours. A field officer will be assigned for criticism of each problem. On days for discussion there will be two sessions of the lyceum, one for the discussion and the other for the critique.

In a general way the problems will cover the following points :

1. A march in advance.
2. A march in retreat.
3. Establishment of an outpost by day.
4. Establishment of an outpost by night.
5. Camping of a command.
6. Dispositions for the attack of a position.
7. Dispositions for forcing the passage of a river.
8. Dispositions for the defense of a position.

#### WRITTEN EXERCISE NUMBER I.

Having given the foregoing instructions the Colonel proceeded to dictate the first problem. The problem and explanation as well as the criticism are here given in full.

He said :

The *problem* is a consideration of the marching orders of a detachment of all arms when the enemy is in front.

*Situation* : A Southern army is marching to the north by roads to the east of Titticut.

On the afternoon of to-day Col. A. of the Southern army is given command of a detachment camped at Titticut. His orders are to disable the railroad to morrow by blowing up the culverts and bridges in the vicinity of Fort Agawam. He is informed that the Woonkinco River is fordable for all arms, that hostile

cavalry patrols have been seen to-day west of the river, and that infantry and artillery of the enemy are one day's march west of Fort Agawam.

His engineer officers inform him that the work of destruction will take three hours. The tools and explosives necessary must be carried in wagons, and can not keep up with cavalry.

The following named troops are placed under the orders of the Colonel :

26th Regiment of Infantry.

1 squadron of 11th Cavalry.

1 battery 6th Regiment Field Artillery.

$\frac{1}{2}$  company of Engineers.

Detachment of hospital corps.

The outposts at Titticut are provided by other troops.

Imagine yourself in the place of Colonel A.

In issuing orders for this command many things must be considered by the Colonel. To make the task more easy, I will enumerate them in nearly the same sequence that they would be presented to his mind. This will assist you to arrange and formulate your ideas before you write out your order. In answering the questions it is desirable that the reason for each decision be given, and where several alternatives are presented, the reasons for your choice should appear. We thus have seventeen questions, as follows :

1. How much of the information and instructions you have received will you communicate to your subordinates ?

2. How much of your plans will you communicate to your subordinates ?

3. How will you employ your cavalry, attached to your advance-guard, or independent of your advance-guard ?

4. Will you specify the duties of the several fractions of your command ? How much freedom of action is allowed your subordinates ?

5. Will you march on one or on several roads ?

6. What hour of starting do you propose ?

7. What dispositions will be made of your train ?

8. What measures will you take to protect the train ?

9. What position will you assign to yourself ?

10. How would you communicate this order to the troops ?

11. What proportion of your force will you assign to your advance-guard ?

12. What distances will you prescribe?
13. Will you designate a commander for the main body?
14. Are any dispositions necessary for guarding the flank?
15. What position do you assign the following troops: Engineers? Hospital Corps? Artillery?
16. Is a rear guard necessary?
17. Write out the complete orders of Colonel A. at Titticut.

It will be observed that sixteen of these questions are an elaboration of the points to be considered in the answer of the last and that the seventeenth answer is really the sum of the ideas brought out by the other sixteen questions.

The criticism at the next meeting was as follows:

In discussing this problem the last question will be answered first. Colonel A. would issue the following order:

DETACHMENT OF 1 BRIGADE 1 ARMY CORPS.

CAMP AT TITTICUT, 9-15-90. 1 P. M.

Detachment orders }  
Number 1.

Distribution of troops 9-16-90.

1. Advance Cavalry. (Major C.) 1 Sq. 11 U. S. Cav. less 1 plat.
2. Advance Guard. (Major B.)  $\frac{1}{4}$  plat. 1 Sq. 11 U. S. Cav. 1 Bat. 26 U. S. Inf.  $\frac{1}{2}$  Co. Engineers.
3. Main Body, and order of march, at 800 yards.  $\frac{1}{2}$  plat. 1 Sq. 11 U. S. Cav.
- II. Bat. 26 U. S. Inf. 1 Batt'y 6 reg't U. S. Field Art.
- III. Bat. 26 U. S. Inf. Detachment of Bearer Co.
4. Train.  $\frac{1}{4}$  plat 1 Sq. 11 U. S. Cav.

I. Cavalry patrols of the enemy have been seen west of the Woonkinco. His infantry and artillery are reported one day's march west of Fort Agawam.

II. The detachment will march to-morrow toward Fort Agawam by the road Sippican-Fearing's-Wing's

III. a. The cavalry will move at 5:30 A. M. to-morrow, and will cover the movement. It will seize the crossings of the Woonkinco and send patrols beyond.

b. The main body will march at 6 A. M. from the western exit of Titticut.

IV. The train will follow as far as Fearing's escorted by a fourth of a platoon.

V. I will be with the main body until 7 A.M. and with the advance guard after that.

A.

Colonel 26 Infantry.

Commanding.

Dictated to superior officers and staff.

Copy to Division Commander.

The explanation of this order may now be found in a discussion of the various points proposed.

1. The information of the enemy may be communicated in the identical words of the problem, but ordinarily a large number of reports would have been received, some widely conflicting, others vague and improbable. Your first duty is to sift these statements and to formulate one which shall be so brief, so plain and so well-substantiated as to give a clear idea of the strength, position and intentions of the enemy. This constitutes the first paragraph of the order. From it you may deduce that the enemy is marching on Fort Agawam because his cavalry is between us and his main body; that they are in considerable force is shown by his having artillery with his infantry; that he will not march on Fort Agawam before to-morrow, you conclude from the time and distance and the absence of good camps west of the river.

As to the special instructions you have received, it is better to keep them out of the written order, although good reasons can be given for either method. The general rule is to communicate so much as may enable your subordinates to carry out the operations in hand. In this case you may simply give a general direction to the march and thus discount the effect of any failure or change of plans. Nevertheless, Colonel A. may consult with the engineer officer in regard to the special work of his detachment, and with the cavalry commander with regard to the distance and extent of his operations which would be beyond immediate supervision. Otherwise, none need be informed of your instructions, except the staff. It has been suggested to explain it all to the second in command, but that officer would be bound to carry out the instructions and plans of the original commander if he should fall suddenly in command, and all necessary information on these points could be obtained from the staff. Although the problem points out the single objective of the railroad, it may be that the Colonel has instructions giving several alternatives and detailing his movements for several days. These things should manifestly be kept to himself.

2. It is a mistake to give any detailed statement of your plans for operating at the railroad itself. This takes into account matters that can only be settled when you arrive on the ground. In most cases your best formed plans will be modified, and you can not even count on reaching the river without an engagement.



To attempt to prescribe beforehand what the troops will do at a certain time is looking too far into the future and it is therefore commencing at the wrong end of the problem.

3. Regarding the use of the cavalry, it may be stated in general terms that as many cavalry as possible should be used. Under this rule all of our cavalry should be on the side toward the enemy whenever the ground admits of its use. It is easy to imagine a case where cavalry could be placed in rear of your column, as in a mountainous country. In mountainous country where you expect to enter an open country very soon, a part of the cavalry might be at the rear of the infantry of the advance guard. We have here a comparatively open country where it may be used as a part of the advance guard, or where it may be made independent of that body. There are strong reasons for both. If you had a relatively weak force of cavalry, you could not give it much independence of action. If you expect an engagement each moment, you would not care to send it far away. Here you have a very good sized force and I think you would use it independently for the following reasons:—it should not be tied to the infantry because its rate of march is faster and it would gain considerably in a march of this length; if you give the cavalry to the advance guard commander, that officer would be inclined to use it in the restricted service of securing the safety of the column, and not in the broader and more appropriate duty of reconnoissance; when the independent cavalry meets the hostile cavalry, it can manœuvre so as to engage the latter to the best advantage because neither the direction of its advance nor of its retreat are obligatory. For instance, suppose a squadron of the enemy should appear in the direction of Manomet, he would be free to concentrate and attack them, while in the opposite case, he could not notice them. The cavalry commander gets his orders direct from Colonel A. without having them filtered through the minds of intermediate commanders. The advance guard commander knows that he must take measures for the protection of the column, independent of the cavalry, and is thus thrown on his mettle at all times.

A small detachment is, however, made from the cavalry for various purposes. These details should be confined to the smallest limits in order to save the cavalry from one of the worst abuses. The following would be sufficient; for maintaining order in the train, six men and a non-commissioned officer; for the

point of the advanced guard, one officer, one non-commissioned officer and six men ; as orderlies, one non-commissioned officer and ten men ; total, one platoon.

4. By "fractions of the command" is meant the advance cavalry, the main body and the train.

This question is simply an amplification of the second. It is only necessary to give them a proper direction at the beginning, and to wait for developments before giving subsequent orders. The road is described explicitly and the cavalry which is somewhat out of hand is limited in its movement. An hour for the march of the main body, and the point at which the head of the main body starts, are to enable each officer to know when his command must leave his camp or bivouac to reach his proper place in column at the right moment.

In the distribution of troops, the commanders of advance guard and cavalry are not told how to march their commands. The order of march of the main body is prescribed because it is considered to be under the command of the Colonel. All details are left to the subordinate commanders.

5. You should use the best road, even if it is a trifle longer. On the turnpike you might march in column of fours, while on side roads you would probably be limited to a column of twos. The high-road will usually be in better repair ; on country roads you will be more likely to encounter bad places which will delay your march.

In most cases it was correctly decided to move by a single road because the reasons for using a number of roads would not apply to such a short column as this.

6. In work of this kind it should be borne in mind that ordinary exertions of troops should be considered. In the usual course of events the command would have reached Titticut after a day's march. They should not be expected to march before the next morning. I consider that the proposition to make a night march is an exceptional and unsafe proposition. The subject of night marches and night attacks is a study by itself. A night march is not considered to be an easy operation. The best authorities say that it will take half as long again as a march by day.

The time of starting is fixed at 6 A. M. when it is broad daylight.

7. Out of about a dozen answers that might be made, four

deserve special consideration. The train might follow the main body; it might move with the trains of the army toward the North; it might remain at Titticut; it might follow to a certain point and stop there and await orders.

The last solution is accepted notwithstanding many good reasons advanced in favor of some of the other propositions. The train is here ordered to Fearing's, where it may be held at the cross-roads, ready to march in any direction. It is near enough to receive orders quickly. It will not be in your way if you are defeated. It can join you easily at your camp for the night. Its position points to a general principle for the disposition of a large train.

8. This small train needs no large guard. A detail of eight troopers and a non-commissioned officer would in my opinion be sufficient to keep order in the train and to protect it from any small enterprises of the enemy.

9. Under modern conditions the commander rides far to the front. In this the practice has changed during late wars. His object in going to the front is not to interfere with the commander of the advance guard, but rather to form his estimate of the situation; to make his plans in good time and to send his orders to the rear. He would not, however, ride with the advance cavalry as several have suggested. It is not necessary that he should start out with the advance guard. It would be better for him to remain at Titticut until all the troops have left. It is a good idea for a commander to see his command march by him each day, after the manner of an informal review. For these reasons, the fifth paragraph is given the form you see here.

10. The order would be issued either verbally or in writing. The difficulty of providing a large number of copies on short notice makes the latter method of little use. It is usual to dictate the order to representatives from the several subdivisions of the command. I say here "dictated to superior officers," meaning the squadron commander, the advance guard commander, and the commanders of each part of the main body. A copy of the order should be sent to higher authority when it involves the carrying out of orders previously received from that source.

11. An important consideration is to preserve the integrity of the tactical units as far as possible. On this account we would select a battalion of infantry as an advance guard, even if it be a trifle too large or too small. Hence, I would never commend an

advance guard of three companies in any command that I can imagine.

12. It is considered that each officer will regulate his distances for himself according to circumstances. In the case before us, however, the Colonel himself directs the main body and gives it an hour for starting. Although it is strictly a part of the duty of the advance guard to take its proper position, it is not unusual to prescribe the distance at which it would precede the main body.

It is hard to say between what limits that distance would be right. In this case you may expect to meet the enemy soon; the country is full of defensive positions where a small force could delay you long, or the reverse. I think the distances should be a little greater than usual to prevent small checks in the advance guard being communicated to the main column. If the main body is eight hundred yards in rear of the advance guard, an order could be sent to the rear and the artillery could be brought up at a trot in ten minutes, or the leading companies of the main body could be brought up in about the same time. These considerations have led to the use of that distance for this particular case.

13. This question is referred to in several others. It is thought better for the commander himself to take command of the main body. He might notify the senior officer of that column when he goes to the front, but the designation of a special commander in this order would involve the issue of an order by the officer so designated. The duties of that officer would be nominal, as the main body must be considered as a special reserve under the direct orders of the chief. I do not believe it necessary to create a new office in the channel of communication between himself and the troops. The officer at the head of the main body may regulate the pace, order halts and rests, but all his independence will cease as soon as he has reported on the field.

14. The cavalry screen will probably provide sufficiently for this. Although there are several parallel roads a command of this size could protect its flanks better by keeping together than by making detachments.

15. Engineers would go with the advance-guard so they may get to work at an early moment; hospital troops are generally assigned to the rear of the main body. They would only be assigned to a large advance-guard in expectation of an action. Ar-



tillery are placed between the battalions of the main body. In country such as this, the greatest precaution to secure the safety of the artillery must be taken. There are many positions affording perfect cover for the enemy's infantry along the line of march and the opportunities for the use of artillery are very few until you reach the valley of Cohasit Creek. If the enemy is encountered, it is better to engage him at a distance than to place the artillery in danger from his skirmishers.

16. Generally speaking, when you begin to calculate your distances and find how great they are in comparison with the length of your main column, the question naturally occurs to you whether this was a case in which one of the subdivisions of the advance guard might be dispensed with. It would be right to do so if it were evident that the safety of the main body could be assured while doing so. As you decrease the size of your advance guard, you will sooner or later reach a point when this must be done. In my opinion, the safety of this command would be even better secured by leaving out the reserve of the advance guard, still this is a matter for the advance guard commander to decide, so it is left out of this order.

Likewise, there is the question as to the necessity for a rear guard. In a forward march the duties of a rear guard are insignificant, and as we have disposed of the train by halting it at Fearing's, I think the rear of the column could protect itself without a special body of troops for that purpose.

It is not sufficient to state that the command will start at a certain hour. The troops would be in bivouacs at some distance apart, and if all march at the same time, a part would be too soon and others would be too late to take their places at the proper time. For this reason an initial point is taken from which all calculations may be made. In this case, it is the western edge of Titticut, a point selected in advance of the bivouacs, which the head of the main body is expected to pass at a designated hour.

A number of solutions give directions about the amount of ammunition, forage and rations to be carried. These items occupied a large portion of the orders during our Civil War. In a well-regulated command, they do not deserve a place in orders for the operations of troops any more than a direction to carry their rifles and carbines.

It is well not to worry about the logic of the situation here given or to seek for difficulties outside the map. Whatever faults

might be discovered, your military duty would remain the same, that is to carry out your orders precisely as they are given to you. A habit of deciding what others should do instead of thinking about what you should be doing yourself has brought disaster to many a good man.

#### MAP MANŒUVRES OR KRIEGSSPIEL.

These exercises were introduced in the following way :

The idea of human strife has long been fascinating to mankind. It is the basis of all of our games of chance and skill,—the most ancient of which like chess and checkers, seem clearly to have been devised with the idea of representing opposing forces in combat, and under old conditions the game idea showed this quite well. In the darkness of the Middle Ages, war was one of the lost arts, but in a century of our high civilization a Frederic, a Napoleon, and a Moltke have appeared before the world, each as an expounder of a system of warfare that was superior to the last. It was natural then that soldiers should turn to the game in seeking to solve the new and complex questions presented by the leading of troops in war. To this we owe the Kriegsspiel or War Game of the Germans,—one of the potent aids to which is ascribed the tactical skill of all officers in the army of the conquerors of Denmark, Austria and France.

Following out the idea of a game, to show the operations of war, we would conduct the exercise upon a map of large scale, with small blocks to represent troops, a chief to command each side and an umpire to direct the whole.

It is evident that the map should present a fairly accurate picture of the ground, that the size of the blocks should bear a proper relation to the map, that the leaders should have a knowledge of drill and tactics and that an exceedingly difficult task is imposed on the umpire. Such a game is certainly capable of an infinite development and may test human intelligence to its limit.

Upon the umpire much depends. He must steer both leaders away from all absurdities ; his decisions must be so luminous as to be approved at once by the judgment of his audience, and his heart must be closed to many fair and plausible excuses. He must insist on the rule that his decisions are to be accepted as infallible,—however many flaws and inconsistencies may have been discovered by the united observation of his critics.

To get a good umpire we have a choice of one of two

methods. The first is to obtain the services of one whose experience makes him able to pass upon every circumstance of actual war. This appears at first sight to be the only logical method but upon examination it will be found to be fallacious. There are very few men with such qualifications, but if we should happen to find one we would probably soon discover him to be an exponent of a number of prejudices due to his own observation or arm of the service or habits of thought. Upon intimate acquaintance with such a man we would find him to be an encyclopedia of rules for his own little game of war, which would differ in many points from the game of another expert of equal experience.

Our second and last recourse is to collect the results of all experience as a basis upon which to predict the course of future events under similar conditions. This requires that a great mass of facts be analyzed, sifted, tabulated and arranged in such a way that a man of limited experience can find from the tables in a minute the probable result of any series of circumstances. The tables then serve the part of an automatic umpire, and, of course, the value of the system will depend upon the care and intelligence with which the tables have been made. Some will claim that a fairly accurate result is not possible in this way but you will find that the method can be applied to well-known conditions in the Chilian war of 1891 and the Chino-Japanese war of last year, with surprising accuracy.

By both methods of umpiring therefore we have arrived at a result determined by experience. We have travelled by different roads, and if the last is not the best, it is at all events the only one available to us. It requires that each community shall possess at least one man having leisure, devotion and intelligence enough to fit himself for the position of umpire by studying the methods and application of the game. This does not seem to be a difficult matter, but it has proved to be so.

The game of war reduced to a book of tables and rules is one of the most complex affairs. Seventy years of patient work by many brilliant minds has indeed produced a beautiful system, and it is pleasant to think that many of its most delicate refinements have been worked out in our country by American officers. Nevertheless, I regret to say that the game is still laborious, slow and only satisfactory after long study and practice. Few officers are willing to accept the duty of an umpire even

under the apparently easy conditions of having their decisions already worked out for them. To make it popular and to make it possible as a factor in the training of every officer we must make it easier, for if its difficulties are great enough to discourage most men, they will make it useless for our purposes. If it cannot be applied at once, here and elsewhere, without long and devoted study, great experience in war and other exceptional advantages, then surely we must look for some other means of instruction.

It is probable that too much has been claimed for *Kriegspiel* and that its best application is in connection with other forms of instruction. By accepting this view, it is easy to make it more simple, both in the manner of playing the game and in the methods to be sought.

It is proposed to discard the idea of a game, in which the object is to show all the conditions of an actual campaign or battle, and to make it a simple exercise in the manœuvring of troops, and in making verbal orders, messages and reports. When you do this, you eliminate all that is difficult or unreal and you silence the most violent critics. The questions of hostile contact and the computation of losses in action have usually been the greatest stumbling-blocks. All this is to be brushed aside in our lyceum course, not because of the criticism but because the exercise has abundant capacities for usefulness as an elementary study without it. At the same time it should not be denied that the advanced form will possess many points of interest to those who are willing to give it the time. As indicated above, it does not seem as if any startling results are to be expected from a use of smokeless powder and new weapons.

The next question is how to make the exercise profitable after we have partially eliminated the tables of losses from fire, the effects of hand-to-hand combat and the results of defeat or victory. There will still be isolated combats and minor questions of hostile contact to be settled in a general way by the umpire, who will, however, make no attempt to arrive at the exact numbers of killed and wounded. Whether or not opposing forces may advance or retreat can be quickly settled by an examination of the formation and numbers of the troops engaged and a study of the ground. As soon as contact has become sufficiently pronounced to cause a general engagement the exercise should be brought to an end.



The place to be assigned to Kriegsspiel in our course of instruction has already been indicated in remarks about written exercises. At that time you gave your entire attention to the issue of written orders, messages and reports. Ample time was then given and you were made familiar with forms and verbiage to be used. Now we go one step further and make this an exercise in making verbal orders and verbal reports. After the exercise is fairly under way all writing will be excluded. Now you will use a verbal form similar to the written forms which you have mastered. You will be constantly called on to answer questions which will require a knowledge of the capabilities of the arms of the service, an understanding of the military situation and an ability to give brief and clear decisions.

Let any man try this without previous practice. He will probably betray a hesitation which will at once be communicated to his subordinates, he will contradict himself, leave important points undecided, ask advice of those whose business is solely to obey. These are great faults in one who aspires to be a leader of men. Few indeed are those who become great in emergencies, with brains that are quickened by danger and inspired by difficulties. The ordinary man learns by a slower but generally surer method.

The books tell us many things that are a result of many centuries of human experience in warfare. If a Cheyenne Indian, a Cossack of the Don and one of Hannibal's Numidians could be gathered together here and told to ride down yonder valley and up to the crest of that hill looking for an enemy, they would probably follow nearly the same route. But a parade-ground soldier, who has never tested the axioms that guide men who have been warriors from immemorial tradition, would hesitate and blunder at each step. His books may have pointed out the true way, but not so that the reason approved or suggested nothing better. Principles are thus learned by the practice of details; operations of minor warfare such as the passage of defiles and bridges, the reconnaissance of villages and woods, and other things are verified in the relations of time and space; and thus we are led to an understanding of the great principle that "*Theory is but the law of facts.*"

I will save time by acknowledging all the common criticisms of Kriegsspiel. For its defects I do not apologize, but my claims for it I will state as follows:

1. It supplements previous exercises by practice in map reading.

2. It has an advantage over manœuvres in presenting the whole situation to your eye instead of a limited view.

3. It gives practice in issuing orders as well as in interpreting and executing them. It gives similar practice in messages and reports.

4. It gives practice in forming prompt and rapid decisions.

5. It gives practice in showing the principles of tactics and their application. In this way it is a most useful adjunct in the study of military history.

6. In the application of principles, it carries out in a few hours operations that would ordinarily consume many days.

This gives an abundant scope for *Kriegsspiel* in our scheme of post training. Within this limited field and with a free confession that merely a portion of your art is here to be learned, I commend the exercise to your attention.

We will use it now as a preliminary to the practice of manœuvres in the open.

The problems proposed will usually be such as can be subsequently worked out in the field with the troops, thereby giving you the advantage of an earlier study of the ground and of the various situations that are likely to arise.

In addition to a map we will need apparatus to show the troops. The excessive cost of the *Kriegsspiel* outfit is prohibitory, but I believe a good substitute could be found in the colored patent-leathers such as we use for trimming our saddle cloths. Small bits of this leather, in colors to show the opposing troops of different arms are therefore provided. The variety of blocks should be small and simple, and their greatest dimensions should be made to the scale of the map. Thus a troop of cavalry, occupying one hundred yards in line or column of fours, would occupy about three-fourths of an inch on the map. The troops are represented in their normal state, unbroken by fatigue, and undisturbed by the many incidents of service which *Kriegsspiel* endeavors to show by its numerous devices. It is essential to know the marching powers of troops of the different arms. For the sake of uniformity in deciding these points it is well to construct a table giving the rate of march of each arm, both under normal conditions and under modifications caused by sloping ground, ploughed ground, vegetation, mud and the like. Having this

apparatus at hand, let us show briefly how we could proceed with an exercise.

The officers detailed to work out a problem are divided into two opposing groups, each group with a commander. They are notified several days in advance. We will call an Eastern force Blue and a Western force Red.

To these officers the umpire issues a statement of the general situation, which embodies so much information as may be supposed to be possessed by both sides. It might be as follows :

General Situation.

A Western army, concentrating behind the Woonkinco River, has a detachment holding the bridge at Fort Agawam. An Eastern force is known to be at Titticut with a larger force ten miles in rear.

Special Situation. Blue.

The army will commence to cross to the east bank in a few days. To cover its crossing as well as to get timely notice of any movements of the enemy, Colonel A. will be sent to-morrow with a detachment to clear up the situation in the direction of Sippican.

Colonel A.'s force is as follows :

1 regiment of infantry.

1 squadron of cavalry.

1 battery of artillery.

Special Situation. Red.

The Red commander, receiving information of the inferior quality of the troops at Fort Agawam, or the careless way in which their outpost duty is performed, forms the idea of capturing the place. Accordingly he designates Colonel Z. for this duty and orders the following named troops to report to him early to-morrow :

2 battalions of infantry.

1 squadron of cavalry.

1 battery of artillery.

Upon receipt of these propositions the commanders called their officers together and assigned them to appropriate duties. The first point then was the issue of orders by the two chiefs. These orders were prepared in writing for submission to the umpire on the morning of the exercise, and were the only portion of the exercise required in writing. The umpire caused the orders to be modified in several points wherein they did not

conform strictly to the situation already described. He also found occasion to repress a tendency on the part of officers to give odd and startling solutions. Let it be understood that Kriegsspiel gives no scope for genius; it requires ordinary exertions from troops and postpones all unusual and desperate situations. We want safe leaders and not Napoleons.

Upon the day of the exercise the officers assembled at the map and the general situation was explained by the umpire.

The representatives of one side then retired while the special situation and the orders of the other side were read. The officers commanding portions of the command were then questioned upon the manner of carrying out the duties assigned them in the order. In proportion to the care with which they had studied the situation and its various possibilities, would they be able to answer promptly and in no uncertain words. No better object lesson in the necessities of many officers is needed than this first introduction to Kriegsspiel.

The troops were placed on the map by the umpire in accord with the information thus obtained. The umpire next prepared a memorandum record to show the changing positions of the troops at different moments in the progress of the exercise. Thus:

BLUE.

7:00 A. M. Cavalry point is 300 yards north of Fearing's.

When these points were settled, the map was covered with sheets of paper, or the blocks were removed temporarily. The Blues retired, the Reds came into the room and the same procedure was repeated.

These arrangements would inevitably bring about a collision of the opposing forces and the result would be a test of the dispositions and formations of each side. At the beginning matters proceeded rapidly, the blocks being moved over spaces covering a considerable time. But as the forces approached each other the time interval between moves was shortened.

At the beginning the principal points to be settled by the umpire were questions of visibility and the action of the cavalry patrols. The latter were decided arbitrarily to a large extent because we do not profess to give a representation of points in which the individual intelligence of troops enters so largely as it does in scouting. The numerous minor combats of small bodies were settled in a general way. The umpire was careful to re-



strain the ardor of the troops, remembering that their boldness in the manœuvres of peace is often in inverse ratio to their eagerness in war; on the other hand, he gave full credit to the confidence arising from greater numbers and superior tactical advantages. He tried to postpone the moment when the exercise would degenerate into a pitched battle, for then it was to end. His authority was exercised to prevent an advance in insufficient strength, and to compel a corresponding retreat of a weaker force, thus keeping the troops apart until the moment when a further change in the situation was not likely to occur.

It appears best to check these tendencies to rush into false and unreal positions, rather than to take the common method of awarding great losses for movements that could never have occurred. A loss that seems relatively small to an outsider will be accompanied by a surprising amount of work, fatigue and demoralization. A company commander who will incur a loss of a single man, when he could have performed his duty as well without that loss, will soon lose the confidence of his men. Unusual sacrifices are rare in warfare, and it is not teaching a doctrine of timidity when it is insisted that the first duty of an officer is to learn to spare his troops.

Let me now attempt to sketch something of the course of events as this problem developed them.

The Blue cavalry was placed with three troops on the high-road, and the fourth troop on the roads at the north and south. The Red cavalry had two troops on the high-road, one troop at the north and one troop at the south. Both had an advance party of one platoon on the high-road. From Agawam to Titticut is a distance of ten miles, and midway between the two is Fearing's farm not far from the point where the turnpike goes down into the valley of the Cohasset. The cavalry of each force left camp at 6 A. M., and marching at a walk and trot, the advance scouts reached the neighborhood of Fearing's at 7 A. M. The Blue scouts ascended the hill and came face to face with the Reds just as the latter entered the stretch of road north of the house. Both halted, a few wild shots were fired, and in a half a minute the advance parties were themselves in presence. Now came the moment for quick decisions from the leaders of the two parties. Interrogated separately by the umpire, Lieutenant B. of the Blues said, "I charge at once with every man"; Lieutenant Y. of the

Reds said, "I halt, dismount, and open fire with carbines from the farm buildings on the side of the road." All eyes were turned on the umpire who said promptly, "The advantage is with the Blues. The Reds can not execute their orders in time." One minute of time more and the victorious Blues ran into the head of the Red column of cavalry. Several Blues were captured, several were unhorsed and the balance got back again, followed by a portion of the Reds who were now in some disorder. Meanwhile the three troops of Blues, hearing the shots, trotted up and reached the top of the hill. Remember, by the way, that this is an ordinary bit of country road, with less than fifty feet of roadway, shut in by wire fences on each side. What will these cavalry commanders do now when each sees this cloud of dust hiding an unknown enemy a couple of hundred yards away? Their answers were almost identical. Each sent his leading troops forward at the charge while endeavoring to hold the remainder in hand. The rear troops cut into the fields on either side of the road and, some mounted and some dismounted, took part in the action. In three or four minutes, the three troops of cavalry aided by a better position defeated the Reds and were in turn stopped by the Red advance-guard at Horton's hollow. The Red cavalry was not able to take part in a new action for fifteen minutes.

A variety of new situations were developed by the superiority of the Red cavalry on the roads at the north and south of the turnpike, while the infantry of the Blues kept on advancing through the valley. The hills at Fearing's were the decisive point of the day. If the Red can get there first and place their artillery, they can sweep the valley as far as the Wewcanted village, and can probably throw back the advancing Blues. If Blues can establish themselves there, they can neutralize the hostile artillery and defeat the infantry by their superiority of force and position. Here the Reds won through defective dispositions of the Blue advance.

The exercise was followed by a criticism by the umpire and a discussion by the participants.

In this way the class of officers proceeded with an active practise of map manœuvres or Kriegsspiel. The exercise which I have outlined occupied several sessions. The eight meetings of the lyceum season were arranged so that every officer was on the detail several times.

## MILITARY HISTORY.

Shortly after the first of January, during the progress of the Map Manœuvres, the officers were notified of the character of the course in Military History which was to begin toward the middle of the next month. The explanation was as follows:

Eight of the sessions of our lyceum course are devoted to Military History. This is a subject that is often misunderstood. Our students reach too boldly for the master's degree, without bothering themselves with the drudgery of learning the primer. It is with a light heart that our military essayists tackle intricate questions of strategy and schemes for defense or invasion upon which books might be written. How usual it is to hear officers, who would have difficulty in leading a platoon over a mile of country road, talking aggressively about the strategy of Napoleon, the stratagems and ambushes of Hannibal, the reinforced flanks of Epaminondas, the drill manœuvres of Frederic, the concentrations of Moltke. Such a system presents the danger of substituting military pedantry in the place of knowledge. The exaggerated professionalism of Frederic's veterans on the eve of Jena is a sad example of the spread of worthless military information at the expense of vital principles. This desultory reading and essay writing is not entirely without benefit, but while it may add to your stock of general knowledge, it does little for your military education; it is about as useful as the reading of a book review instead of the book itself.

It is proposed to approach the subject of Military History in a series of essays and discussions upon points which we know have engaged the attention of our soldiers, and which we may be certain will arise before us in the early days of another war. In the limited sphere in which most of us would act, it is not likely that we would be bothered by grand strategy, but each hour would be full of anxious care about many of the minor points in which we would be called upon to exercise judgment and discretion.

We will choose an American campaign, presenting those curious phases which are peculiar to warfare in our own land, and we will make it a skeleton upon which to hang a few problems in the leading of troops.

Sherman's Atlanta campaign is selected because its literature is voluminous, the maps accurate and accessible, and because it can easily be made to show a thousand details of marching,

bivouacking, field entrenchments, outposts, advance guard, rear guard, reconnaissance, attack, defense, supply, foraging, etc. In many cases these details are hard to find because our military history was not written for students of the art of war, because their value was not foreseen in those days, and because the actors in great events quickly forget the small matters and only remember results. Nevertheless we will make it a study of details, and after getting the framework from published accounts, we will supply the gaps from our study of the text-books.

It will not be sufficient to say that Sherman detached McPherson to make a flank movement on Resaca. We want to know all about McPherson's concentration of his army and the marching orders down to the orders of many of his subordinates. By what marches, halts and camps was that army brought on a single road to the point where it was expected to issue from the mountain pass upon the line of Johnston's retreat? How were those things provided for, how executed, and why did it fail? Where was the cavalry, what did it accomplish, and how was its screening and reconnaissance duty performed? What problems of transportation and supply were presented and how were they worked out?

Similar questions are presented in the action of the other side in making a show of resistance upon an extended front and withdrawal from Dalton to Resaca. Then came the retreat from Cassville and beyond, etc.

Each officer will be assigned to work up some point and the nearer we come to fixing in our minds the duty of the lieutenants and captains the better we will accomplish our object.

No doubt we will miss the clever strategy of some of the great masters. Let us then remember that strategy often fails in the presence of good troops under equally good officers. Napoleon's strategy was always magnificent but failed as soon as the execution began to be faulty. It has often failed against the self-reliance and recuperative power of American troops. There is also a suspicion that much strategy has been manufactured after the event in post-mortem attempts to bolster up the reputation of some and to tear in pieces that of others. Moreover, it is often easy to draw opposite conclusions from similar events in history. The student is often puzzled by this. Thus we may deduce from the Eckmühl campaign that it is right to interpose your army between the portions of an enemy's extended front,



and from the Königgrätz and Waterloo campaigns that it is wrong; from Manassas and the Atlanta campaign, that it is right to make a detachment to strike an enemy in rear, and from Kulm and Hanau that it is wrong.

As an example of this kind of work let each of us suppose himself in the place of one of Grant's division commanders on the day before Shiloh. If mistakes in the outpost and reconnaissance duty were made let us show that they would not be ours. Thus throwing the light of history upon our problems we learn many lessons.

#### WAR RIDES.

In former exercises the ground was represented by the map, and the troops by the blocks in Map Manœuvres, or the troops were entirely imaginary in the written exercises. This practice seems to have filled its mission, which was a limited one as I have explained.

But it must be confessed that the best map gives a very poor picture of the ground. We only accept it as a guide in the darkness, to be supplemented by the real ground drawn in full day upon the human retina. Hence the time has arrived when we may advance another step in our career and solve our military questions on the ground itself, but still without the presence of troops. By taking up some of the problems that we have worked out indoors, we will best understand the relations that exist between the ground and the map. We discover at once the defects in the best topographical work. We verify, among other things, the statement that only general directions can be given from the map and that details must be left to the man on the ground. The troops must for the present remain imaginary because our object is to develop the military eye, and the habit of making correct decisions throughout the roving incidents of a day. If the troops were present, you would be hurried and hampered by their care.

A distinguished officer once told me that long after the war was over the habit clung to him of solving the military capacities of every landscape. Mechanically he found himself sending his skirmishers through every field, arranging his lines, establishing his batteries and posting his reserves; now weighing chances of defeat, now gathering squadrons for attack. No doubt, his mind did also people each bit of road or field or woodland with its

struggling hosts, and banners high and corpses in the dust. It was so because these things had been burned into his soul on many a hard and doubtful day of war. He said that from boyhood he had been a so-called professional soldier, but that outside of drill and discipline his knowledge of the practical side of his business was nothing when the war began. He had made many mistakes, but, fortunately, they were so greatly overshadowed by the more dazzling blunders of other 'professionals' in a wider field, that they escaped notice and he was able to go on learning by the failures of others. This hiatus in the training of that day is what we are now trying to fill. The future may be nearer to us than we think, and national cemeteries filled with the military 'mistakes' of professional soldiers, let us hope, will be scarce after the next war. To those who go through life trusting that some God-given ray of genius will surely pierce their understanding and enlighten the day of action when it comes, I say, do not deceive yourselves. Mortals who are favored in that way are rare. Study attentively the experiences of Grant at Shiloh, Sherman at Bull Run, Lee in West Virginia, and Jackson at Falling Waters. Reflect upon what would have happened to some of these commanders in a Chinese or a Turkish army.

These excursions to which we will now give our attention will be named 'War Rides.' By analogy to that familiar term—the 'sham battle,' which we justly reprobate,—they might be called sham manœuvres. They have a wide application and may vary from the duties of a small patrol to the great operations of a campaign. Thus on a modern field of operations a detail of officers might have in mind Johnston's retreat by successive steps before Sherman's advance in Georgia, selecting defensive positions beforehand and indicating the lines of intrenchments to be occupied by an imaginary force. Remembering the work accredited to the German staff before the war of 1870, another detail might ride out to select ground for future battles in a neighboring State,—arranging tables of march, artillery positions, requisitions and quarters for troops. Or to take a more familiar terrain, we might encamp our thousands on a league of ground about Fort Agawam, or force a passage of the Woonkinco, or delay an enemy from the positions of Scituate and Onset. For the present, however, the problems will take a more elementary form. The questions will be answered verbally or in writing after a study of the open country. Some difficulty will be experienced

at first in giving sufficient variety to the exercise, while keeping a supervision of it. It is easy to set problems covering a wide extent of country and a variety of military duties, but it is hard to watch the work of each man, to assist him by advice and to point out his errors. The earlier exercises are to be selected with this end in view ; afterwards, a greater range will be given and more independence of action will be allowed. Our War Rides will take place in the early spring and will continue with more or less frequency during the entire period preceding the manœuvres of the troops in the fall.

#### WAR RIDE NO. I.

The object of the first exercise was to get a general idea of the country and to give an object lesson in scouting. All officers below the rank of major took part. On the day designated, about the middle of the month of April, the officers assembled, mounted, at 7:30 A. M., and the commanding officer explained the exercise as follows :

For the exercise of to-day, the country west of the post is selected, comprising an area of fifty or sixty square miles.

The scouting will be from a north and south line through Sippican, westward to the post. The officers will ride to their positions so as to be there before 9:30 A. M., and will begin scouting at that time. The objective point is the parade ground of Fort Agawam at 12 M. You will see that you are now doing a portion of the scouting and screening duty of some of our previous exercises.

Four groups of officers will be formed, after deducting those who are to represent an enemy. To each group a route will be assigned. The senior will conduct the operations of his group and will detach officers from time to time on the various missions contemplated by these instructions. Each officer when detached, may consider himself to be followed by a patrol, and each chief of a group may consider that he commands one of the contact troops of a cavalry screen. The particular mission of each group is to discover other groups distinguished by their brown uniforms. These groups will be either concealed or marching. If marching they will be on a wagon-road sufficiently well defined to permit passage of cavalry or infantry in column of twos. If concealed in open ground, they will be so placed as to have a field of fire for 200 yards on the road, and will not take advantage of cover that

will not conceal a battalion of infantry, or a squadron of cavalry at least. If concealed in woods, they must be near enough to have a good fire on the road. These rules will enable you to avoid beating every cover that would conceal an insignificant force, but it will be necessary to search groups of buildings, ravines and woods, and to ride to the crest of many small folds of ground. On discovery of a body of the enemy, ride up to the commander and hand him a regular patrol report addressed to me. The report will state the fact of meeting, with time and place, and will be brought to me at the rendezvous. After being passed on the road or after having been discovered, the Browns will also go to the rendezvous.

The gaits employed will be walk and trot of the cavalry drill book; the gallop will not be used in these exercises.

It is hardly necessary to say that the actual contact of hostile forces is not contemplated. It is simply intended to impose the task of making such an examination of the country as you would make in actual service. If both sides do this work equally well, the hostile groups must be discovered.

A written slip was handed to the chief of each group giving the route to be followed in each case. The Browns were also instructed and the exercise began.

At 9:30 A. M. therefore the four groups were ranged on the line through Gibbs' Sage's Sippican's Croft's, as they had been directed, and within a few minutes of noon they rode into the post from the several directions.

The conductor of the exercise assembled the officers, questioned those who had commanded groups of both sides, and gave the result as follows :

Of the four groups, number 1 was deceived by a false trail on a side road; number 2 discovered the enemy in a ravine of the valley of Cohaset Creek near Brinley's; number 3 did not discover the enemy; number 4 discovered him behind a fold of ground west of Bourne's.

This exercise, repeated in a different direction each day, gives an excellent practice in some of the essential points of scouting.

#### WAR RIDE NUMBER 2.

A detail of cavalry officers reported at 8 A. M. on the morning following the last of the scouting exercises just described. The officers were provided with map, pencil and memorandum pad.



The squadron commander received them and gave the following instructions :

Gentlemen: Open your maps. You will bear in mind the problem of an advance from Titticut. Put yourself in the positions of the commander of a contact troop on the road by Croft's-Sylvester's-Bourne's. At Bourne's you get a message that the planks of the bridge over the creek have been removed, and that a platoon of the enemy's cavalry is dismounted on the high ground west of the bridge. You are required to make a report on the following questions :

1. What do you find from a reconnaissance?
2. What verbal orders do you give? This does not mean the commands of the drill book.
3. What plans do you make?
4. What message will you send to the rear?
5. Make a tracing or sketch showing your dispositions at 1200, 800, and 400 yards from the enemy.

The message referred to in the fourth question will be written on a regular message blank and will be attached to your report which will be submitted to-morrow morning. You may start at once.

The delay detail was made until all the cavalry officers had solved the problem. The squadron commander then took the bundle of reports and rode out to the ground, where he read the papers and made notes of each. On the following day, he assembled the officers and rode with them out to the ground, and made the following remarks :

Reconnaissance shows broken and hilly country, not fit for mounted action. Cohaset Creek flows through deep, wooden banks, is boggy at most places but can be crossed on foot. At the north, we can get a sheltered approach to the creek bank where there is a good ford; on the other side of the creek by this route, we can also get cover to within a couple of hundred yards of the enemy's flank or rear. At the north there is a ford at about the same distance, but it can only be reached by a considerable detour, and on the west side the ground is open.

The disposition to be made of the horses will determine the plan to be adopted. A frontal attack or one by the north ford would involve leaving the horses and make it necessary to repair the bridge before crossing. At the south, the horses can be kept

together, close to the troop, the line of retreat is in no danger, you can either attack the enemy in flank, or you can mount and leave him if you please.

The verbal orders will be as follows in sequence :

By signal to the advance party :

“Halt and observe the enemy.”

Verbally to Sergeant A. :

“Take four men of the rear squad. Look for a crossing south of the road. Return in thirty minutes.”

To Corporal B. similar orders for a patrol to the north.

By messenger to the commander of the advance party :

“The troop will cross at a ford half a mile to the south. Keep the enemy occupied until my attack begins; then follow me rapidly.”

The captain makes a brief explanation to the troop of his intention to move under cover to the right and rear of the enemy, details an advance party and goes forward.

Accuracy of detail, combined with brevity, is important. These papers show numerous faults in these respects, but on the whole, they are very creditable for a first exercise. In the best solutions, the reconnaissance was as complete as possible, the troop was kept well in hand, when dismounted, the horses were not far away, a safe line of advance was taken and several courses of conduct were open after crossing the stream. These essentials of troop leading were not kept in mind by all. Some provide for an attack in front and on both flanks; others would allow the troop to get a mile away from the horses.

The Major further commented on the wording of the verbal order and on the form of the messages sent to the rear. He ended by reading several of the best solutions.

On the same day a detail was made of infantry officers to work out a phase in the march of an advance guard, and artillery officers were given questions to solve in the appropriate duties of their own arm.

As an elementary form of work, this exercise has several advantages; it can go on each day of the target and drill season with only such a number of officers as can be spared from those duties; the small number of papers handed in each day can be carefully examined and scrutinized by the superior assigned to the work; and it gives an abundance of time for a study of the questions.

## WAR RIDE NO. 3.

The variety that may be given to these rides is only limited by the boundless possibilities of actual war. As the officers acquired more skill and confidence the exercise progressed more rapidly and covered more ground.

A useful form of the exercise was as follows :

A detail of officers rode to the eastern end of the iron bridge over the Woonkinco. Each officer was provided with a map, a pencil and a pad of "message blanks." Upon arrival at the bridge they dismounted and the orderlies led the horses to the rear.

The field officer in charge of the exercise then addressed the party as follows :

"It is 7 o'clock in the morning. You belong to a squadron of advanced cavalry of a force coming from the west. Whether it will camp at Fort Agawam to-night or not will depend on future developments about the enemy. When last heard from the enemy was camped along a creek about four miles east of Sippican.

"Your advanced party is now at the west end of the bridge."

After the officers had been given time to fix the situation in their minds they were rapidly questioned upon such points as follows :

"What would be the composition of the cavalry point ?

"How would it approach and cross the bridge?

"What disposition would it make on reaching the eastern end of the bridge?"

When these matters were settled the Major said :

"It is probable that the cavalry commander would have been riding with the first formed body of troops and would have joined the vanguard which had halted just beyond the bridge.

"Several questions would be presented to his attention. To make it certain that his infantry will not be attacked in the defile of the bridge he must examine the country for some distance to the front and flanks, and must hold the high ground at the east of Fort Agawam until relieved by the infantry or until the enemy has been surely located at a distance.

"Now write the dispositions of the cavalry commander. Twenty minutes are allowed."

At the end of the designated time the Major said :

"The solution of Lieutenant X. is accepted. It is as follows :  
'The main body, being about two miles in rear, we have more

than forty minutes in which to make our reconnaissance, without delaying the head of the infantry column. Cavalry patrols will trot six miles in that time and we can walk our horses to Wewantet village in the same time.

“ ‘Two patrols are sent out at a trot. If the enemy is discovered they will observe him and send duplicate reports to me and to the infantry commander at the bridge. If the enemy is not discovered the patrols will report to me in 45 minutes at Wewantet.

“ ‘Patrol No. 1, 8 men and a non-commissioned officer, moves toward Nemassaket.

“ ‘Patrol No. 2, 6 men and a non-commissioned officer, moves by Fort Agawam towards Bourne’s.

“ ‘These patrols are taken from the troop of the vanguard which is now reinforced by another troop and moves out toward Wewantet in proper form.’ ”

Officers were detailed to ride over the route prescribed for the patrols under the supposition that an enemy was not encountered. The balance of the party then rode to the village, where the patrols reported in due course and were closely questioned as to the extent of country traversed and their observation of it.

The Major then said :

“Our patrols report no signs of the enemy. The infantry of our main body ought to be now crossing the bridge which they will do without difficulty. I decide not to wait to be relieved but will push on to try and locate the enemy. Write your dispositions at this point. You will have 20 minutes.”

The accepted solution stated that owing to difficulties of communication an entire troop would be detailed to explore the roads north of the turnpike and a second troop on the roads to the south. They were started out 15 minutes ahead of the main body, one by way of Conkling’s and the other by way of Bourne’s with orders to communicate with the main body at all cross-roads.

The officers were told to imagine themselves in the place of the commander of the troop moving by Conkling’s and the party then rode in that direction.

At Prince’s the Major announced that a connecting patrol dispatched to the south had failed to find our troops but that four guidons of the enemy had been counted on the Sippecan road, moving west.



The various phases of the military situation, thus developed, were then discussed. The decision was finally announced to leave the troop concealed at Prince's while patrols were sent out to observe the high road and to try to discover the force and intentions of the enemy. A report, in proper form, giving the result of operations up to this moment, was written and discussed.

The detail of officers then followed the fortunes of a patrol riding by Gibbs'-Sage's to reconnoitre the village of Sippecan. This closed the exercise, and the party returned to the post during the afternoon.

The War Rides were distributed at convenient times during the period preceding the field manœuvres of the garrison, it being understood that the rides closed the course prescribed for officers without the presence of troops.

Throughout every effort was made to give the course a progressive character, having in view the fruitful lesson that it is wrong to throw a man into deep water before he can swim in the shallows.

#### CONCLUSION.

The criticism of the last ride was closed as follows:

Some indications have been given for a course of training for officers which could be applied throughout our army at once, without legislation, or appropriations of money, or orders from a higher authority. Its aim is to make each battery, troop and company a school, and each garrison a university for the study of the duties of our profession. It dispenses with recitations at posts and uses text-books only for reference.

One of the results of such a course would be to improve the curricula of our schools of application and enable them to be turned into veritable war colleges and staff schools. Subjects now studied by a few would be universal in the service. The practical ability of officers and not their book learning could be tested in examinations for promotion. With improvement and development and comparison of methods, new fields for the enthusiasm of our best officers would be opened. Continuous practice and study might be necessary to keep in touch with your profession,—thus discouraging details and turning our bright men from attractive civil pursuits. For the indifferent and the indolent there are remedies in the examination for promotion and in the 62d Article of War.

It has been within a comparatively short time that the

most methodical nation in the world has reduced the leading of troops to an exact science. The Germans have utterly dispelled the fallacy that "*War alone teaches war.*" Under a careful system of peace training, they have been able to develop safe leaders for great armies in the field. No private soldier among them carries a marshal's baton in his knapsack, their "lords of war" must struggle along in subordinate positions until past middle life, but their veterans of forty years of peace service take the field with the serene confidence of men who have fought in a hundred battles. Their Napoleons and Cæsars are at this very moment writing books and working out kriegsspiel problems. Thus has the character of war changed.

In closing now the labors of the class of officers at this post for another year, let me urge you to give serious thought to these words of Ruskin:

"The sin of idleness is a thousand fold greater in you than in others; for the fates of those who will one day be under your command hang upon your knowledge: lost moments now will cost lives then, and every instant which you carelessly take for play, you will buy with blood."

Following are samples of the message blank and envelope, reduced to  $\frac{1}{4}$  size:

SENDING DETACHMENT	LOCATION	DAY	MO.	HRS. a. m. or p. m.	MIN.
RECEIVED,					
To					

To	ARRIVAL
	DEPARTURE RATE OF SPEED
This envelope will be returned to bearer.	

## LAND MINES.

BY FIRST LIEUT. GEO. L. ANDERSON, 4TH U. S. ARTILLERY.

**F**IXED mines—both land and submarine—passed out of the condition of theory and experiment and became effective and legitimate weapons of defense during the American Civil War. The apparatus, hastily contrived by the Confederates in desperation for lack of a navy, and the skill with which they turned it to the protection of their long seaboard and certain inland places, are the subjects of a long chapter in the record of human enterprise.

They had not in the beginning materials or trained men or, to any great extent, the experience of others to guide them, yet their mine operations were so successful as to wear away the first feeling of indifference felt toward them by the Government which was finally led to adopt similar means and methods. During the rebellion 37 vessels were sunk or put out of combat by torpedoes while not more than half a dozen were equally disabled by the more costly guns on shore. After the first casualties, no federal vessel ever ventured to pass over waters suspected, or known, to be mined while they appeared seldom, or never, to hesitate in sailing past sea-coast guns.

Both the water and the land mines were of all sizes and shapes, often made out of materials intended for other uses and laid by men detailed from the different arms of the service; ninety per cent. of them were operated by purely mechanical devices in great variety which were uniformly subject to speedy deterioration. They would sometimes explode prematurely causing accident and at other times miss the one chance and excuse for their existence and not explode. Still the use of them continued to increase to the end of the war, and after its close many European nations, as a result of their observations in America, appointed torpedo boards and undertook at great expense long and thorough experiments to develop systems of mines. England, Austria, Sweden and Denmark took the lead in the investigations abroad, but the most extensive and reliable trials were made subsequently in this country by an engineer officer. Several powers now keep land torpedo apparatus and stores, as well as submarine, in readiness for war

and a small body of men in training to lay them, and the methods of their operation are laid down in manuals.

Thousands of land mines were planted during our Civil War outside of fortifications and in passage ways it was desired to obstruct. They were found around Savannah, Fort Wagner, and in several places on the Peninsula. The failure of the attack on Fort Gillmer in 1864 was due, Captain McEvoy states, to them. These were simply 9" spherical shell filled with gunpowder. A sensitive fuse in the usual fuse hole was capped by a little fulminate and over it was placed, without touching the fulminate, a conical tin case which slid down and fitted closely over the spherical form. The shell being placed just beneath the surface of the ground, a half pound pressure of a man's foot was sufficient to force the tin case down and explode the shell. It was a crude device, hastily improvised to meet an emergency, dangerous to plant and, when no longer required, to take up. It was liable to become inoperative soon after being set and there was no means of ascertaining its condition. It lacked most of the requisites of a good mine, but still accomplished very well the purposes for which it was intended.

During the siege of Paris, 1870, the French placed land mines in the dead angles and at few a other points outside the main city fortifications where streets from the suburbs led within. The avenues of Châtillon and Orleans were two of the sites selected. For instance, in front of the latter's porte five mines operated electrically were placed 100 yards apart along the middle of the avenue. The battery and operator occupied the small recess, previously blinded, where the city taxes on produce entering town are usually collected. Traffic went on as usual over the mines and the enemy was informed of their existence with good effect.

The English have successfully laid gun-cotton mines fired by electricity. In the Soudan the cask containing the charge, fuse, battery and circuit closer was placed just beneath the surface. It had two circuits normally open—one leading to a key in the fort and the other to the circuit closer in the cask which closed only when the cask was turned over. It could thus be fired in two ways—by an observer in the fort or by the enemy in attempting to take up the mine. Attempts made by the Arabs near Suakim to cut the wires during darkness and remove some of the mines were attended with such consequences as to make night attacks rare. Gordon's improvised mines were of the roughest descrip-



tion but they delayed the fall of Khartoum. According to the diary of one of his officers, 9 mines exploded one day disabling 140 of the besiegers.

The Austrian government paid \$20,000 for the patent on its land mine. The case has two compartments, one for explosive gelatine and the other for the detonating apparatus. Three electric wires leading from it served to arm or disarm or explode the torpedo. The field type weighs 4 pounds and a mule with the flying column carries 24 of them to secure the halting places at night ; that for permanent fortifications weighs from 30 to 100 pounds. The radius of destruction of the 4-pounder is 20 feet and of the 100 pounder, 400 feet. It is claimed that 60 Austrians can block a front one-half a mile long in fifteen minutes and that two or three field mines hidden in a roadway will render it impracticable.

The Russians have made use of a cast-iron case containing pyroxyline which is operated mechanically by means of two wires at a maximum distance of 2400 feet. The upper part is arranged to break into a great many fragments. Fifty trained men can plant 170 mines of this kind in half an hour and render a front one half a mile long unapproachable. Russians mines arrested the attacks made by the Turks at Shipka Pass, August 21, 1877.

In Italy the case of the land mine is of metal, six-tenths of an inch thick and is shaped like a funnel. It holds  $3\frac{1}{2}$  pounds of explosives, the nature of which is not known, and is fired electrically. By means of a steel spiral beneath, it is screwed into the ground.

The Belgians keep a large stock of torpedo material on hand. They expect to make extensive use of mines in case of war and guard well the secret of their system.

It is difficult to obtain reliable data upon this subject. The countries mentioned have given it the greater amount of attention and reference has been made only to the most notable successes obtained with land mines. The record of their failures is much longer. These have been due to imperfect methods of construction and lack of knowledge and skill in handling. They have been hastily built to meet an emergency, their preparation has not been undertaken until after the war began and the necessities of the defensive became urgent. They were then laid by untrained hands. Their condition could not be known until tried by the enemy and the explosive has usually been gunpowder.

The mechanical class in which the fuse is fired by a blow or friction is still retained to a small extent. The Swiss mine of Pfund and Schmid stands perhaps as the best of this type only because the number of its faults is less than in others. Its iron shell, 8 inches in diameter, is hemi-spherically shaped to afford a base and is cast in three concentric layers, each about  $\frac{1}{4}$  of an inch thick, so that it will break into a great many pieces. The charge of about one pound of gun-cotton will distribute 200 splinters over an area of 100 yards in radius. The brass detonating mechanism for firing the mine resembles that in the bolt of our service rifle. One end screws into the top of the shell and its upper end has a movable contact piece which on being pressed downwards or sideways releases the firing pin if cocked. The pin is cocked and locked as in the rifle. It can be doubly locked by means of a staple pushed through two small holes of the casing so as to engage the firing pin. A string or light wire, 100 yards long, is fastened to the staple.

To set it, dig a small hole 8 inches deep; then in regular order cock the bolt, double lock it by means of the lock and staple, screw it into the shell previously charged and, after laying the mine in place, cover with dirt. The main lock is unlocked just before the last dirt is thrown on. Then at 100 yards distance pull out the staple by means of the string and the locality at once attains an importance which the operator is in honor bound to describe particularly to his friends and to give notice against trespass in a general way to the enemy. To take it up later, it will be necessary first to find the mine—a preliminary almost as difficult as that to cooking the historical hare; then remove the top earth carefully and insert the staple as soon as possible.

Its imperfections are quite apparent. It can be fired only by the enemy and when he is directly above it; the operator has very little control over it after being set; he can not fire it or take it up, when no longer required, without danger; if in good order it fails to distinguish between friends and foes, and its mechanism is quite liable to be damaged by rust. Generally it may be said that a case containing explosive and a friction primer or percussion cap or acid and chlorate of potash, with a mechanical device just over it for operating, is a precarious package to handle.

On land as on water torpedoes are to be regarded as simple and inexpensive adjuncts to the usual means of defense. They supplement but do not supplant. They can be made powerful

adjuncts in demoralizing and, often unaided, in defeating the assailants. Perhaps, not one mine in twenty planted will ever be called into action, but it must not fail for any cause when its opportunity arrives. It must not only be certain to operate then but its operation must be effective. These results can be obtained far more readily on land than on water.

It is believed that land mines should possess the following qualities :

- 1st. Destructive in a horizontal direction ;
- 2d. Simple, portable and cheap ;
- 3d. Safe to plant, pick up, verify and fire ;
- 4th. Capable of explosion by the enemy automatically and by the operator ;
- 5th. Unaffected by dirt, dampness or temperature ;
- 6th. Capable of being made instantly dangerous or safe at will ;
- 7th. Admit of concealment.

Some of the developments which have been made in the industries within the last few years render it possible to secure for mines the more essential of the foregoing properties. A reliable explosive, such as gun-cotton or gelatine, five or six times stronger than rifle powder for mine use, may now be obtained in the market and will lie for a long time uninjured under the conditions imposed. The modern dry cell will stand on open circuit in store or in a mine for a long period without deterioration and will act promptly and with its full effect when called upon. One cell may redden a bridge fuse. The bridge fuse surrounded by a little gun-cotton or mealed powder, well sealed up, has replaced all other kinds of electric fuses and such uniformity in manufacture is now obtained that the current strength required to fire will not vary by one per cent. Quite as important are recent industrial methods adopted for insulating all of the active parts of an electric system from each other and making them dirt and moisture proof.

These improvements have been appropriated by Dr. Weber of the Neuchâtel Academy in his recent and very ingenious land torpedo. It operates with certainty under water or ground. A small hermetically sealed battery is placed within or near the mine case. From the case two insulated conductors lead away to a rubber tube which if pressed or stretched or cut at any point of its length will produce explosion. The rubber tube is laid in the

dust across a road or in the grass of a glaciis over which the enemy may pass or in the jamb of a door which he may open or along a barricade likely to be disturbed. It may be set in a river or shallow water where hostile boats are expected. In laying, the shell containing the charge and bridge is first placed where it promises to do the most good, then the rubber tube is put in a hidden position most likely to be misplaced by the enemy, and finally the two conductors from each are run to a third position safe from premature explosion where the circuits are verified and joined to the battery. The various parts are safely taken up in inverse order.

In another mine, the explosive is sealed up in a cast-iron case, the battery is contained in an earthen or glass jar, the circuit closer is effectually sealed up and all of the other working parts are sufficiently protected against injurious action from water and other causes. Its condition under ground will remain good for a long period and may be verified at any time. It may as readily be taken up as laid down and fired either by the observer or by the assailant passing over it or over any one of a number of places in its vicinity. Three or four cells will serve a large number of mines which, if an area requires protection, may be arranged like submarine mines, in groups or skirmish line order.

Any one of them will give warning of a hostile approach in fog or darkness or when, for other reasons, he can not be seen. It is certain in its action and very cheap and simple. The horizontal effect of the ordinary bursting charge has been increased at the expense of the upward and downward effects. If an area is to be guarded the effect will be approximately the same in all horizontal directions; if a passage way the greatest effect will be made to occur in a longitudinal direction.

The shock action alone of a mine charge of high explosive is not sufficient. The detonation of six pounds of gelatine or gun-cotton will not inflict serious injury outside of a radius of six yards. The explosion of 46 tons of powder and 30 tons of dynamite at the Cape of Good Hope in 1884 did no harm to men fully exposed 500 yards away. The containing case should, therefore, be of a nature to break into a great many fragments. The destructive effects may be further increased by placing stone, broken iron and other hard materials at hand around the mine case when in position. It is estimated that three drilled men can set a mine free from observation in ordinary ground in 30 minutes. If the radius of destruction of a 5-pound mine is 10 yards, a company



can plant in an hour 2 acres or protect a front  $\frac{3}{4}$  of a mile long with material hauled by 4 horses at the usual rate of marching.

When possible, mines will be laid in positions which can be swept by gun fire in order that the enemy may not take an undisturbed survey of the ground. Those positions will be carefully indicated upon a map and a rough reference made to them upon the ground by blazing trees, marking boulders, etc., in such a way that the marks will not attract attention. The mines will be placed in rows, quincunx, or echelon order for better protection and subsequent search, if desired.

The sites, ordinarily to be selected, will be just outside of a fort where the assailant may congregate or over which he is likely to pass in a night attack, again, where entanglements are usually placed or vigilant sentinels are required, along the flanks of a defensive position and in the approaches to it if an open assault is dreaded and in mountain defiles. In the retreat of an army or any portion of it there is no means more ready and better calculated to discourage a close pursuit. The mine is the weapon of the defensive. It is continuously operative. All other weapons fail during fog and darkness or more than one half the time. If the enemy shall always be apprised in a general way of the existence of a field, it will not only be in conformity with an unwritten law of war but will really add to the effectiveness of this means of protection.

To make this means as secure as now possible it appears to be well settled that—

(1st) The charge will be gun-cotton or other high explosives ;

(2d) The mines will be operated by means of currents through a bridge fuse ;

(3d) They will be laid by a few trained men and not by details—in sets of 1 to 7 mines to be operated from a single battery ;

(4th) The destructive effects will occur from fragments of the case and missiles laid around it and not from shock action ;

(5th) Success of any system is to be looked for mainly in simplicity of construction, safety in laying and certainty of action ;

(6th) Intimation to the enemy of the field's existence in order that this mode of warfare may always be open-handed.

## ARMY UNIFORM.

BY CAPT. THEO. A. BINGHAM, CORPS OF ENGINEERS U. S. ARMY.

NOW that the issue of regulations for uniform has, according to press reports, been postponed, it may not be inadmissible to offer some suggestions on the subject, resulting from an experience which includes five years of observation in Europe on uniforms not only on gala occasions but in the field as well.

Let us, beforehand, consider what the ideal uniform should be (although ideals are never reached), throwing away all preconceived notions and traditions, and basing only on common sense and practicality, which are supposed to be preëminently American characteristics.

It will no doubt be granted that the ideal uniform should

1. Be suited to the work to be done.

2. After suitability has been obtained, possess a certain amount of ornament and smartness, because, on account of our mortal nature, smartness plays a not unimportant part in attracting recruits, under our system, and in satisfying the vanity of the military world.

The work of soldiers, which we should consider, must surely be that of campaigning and not of peace. Field service of soldiers is quite similar to that of pioneer settlers in a hostile country or of hunters. The process of natural selection has caused such people to adopt a dress

1. Of comfortable looseness, especially about the arms and neck.

2. Warm.

3. Full of pockets.

4. Made of materials which wear well and are as impervious as possible to wind and rain.

Such a dress is substantially of a dirt brown canvas, lined with flannel and full of pockets. Well-oiled boots and a lined (ducking) helmet of similar canvas complete the costume. Add to this a long canvas flannel lined greatcoat with high collar and plenty of pockets and about all has been done that is possible to enable a man to withstand the elements.

As regards "waterproofs" there is probably only one exception to the rule that they are not waterproof, viz., the so-called "fishskin" used by sailors or the "slicker" of the cowboy.

The ideal dress above described may be regarded as the best for the work yet devised by man, and a soldier's work in the field consists mainly of marching and camping regardless of weather or temperature.

There need be no fear that such a dress or anything like it will be adopted for the United States army in the near future. At the same time objections to it are bound to be sentimental or based either on ineradicable preconceived notions and prejudices or on that terrible bugbear "precedent."

All will, however, perhaps, agree that any uniform adopted will meet the requirements of common sense and practicality only as it approximates to the ideal costume—it being premised that common sense is not always possible or, at any rate, politic.

Before passing to specific suggestions for uniform, in which the question of ornamentation is avoided as much as possible, because the taste of no two officers would be the same, let me enter an earnest plea against the use of ornament beyond what is needed for distinctions of rank and arm; and this for two reasons:

1. It is contrary to the American idea regarding public officers of the general government.

2. It is an unnecessary hardship to impose avoidable expense on officers whose salaries are limited, who have frequently to change station by order, always at great expense, and who have, on account of the popular feeling regarding the standing army, to own also decent and necessary civilian clothing.

#### BOOTS AND SHOES.

The present regulations which permit officers and men to buy their own shoes is practical and has produced the best results and could not be improved on.

The regulation riding boot is good, but there is room for improvement in

#### SPURS.

The spur itself is well enough, but the method of attaching it by strap over the ankles and chain or strap under the foot answers no special purpose not answered by another device. This method permits the spur to become tangled with grass and bushes and involves an unnecessary trouble in cleaning and polishing.

Moreover this method requires for perfection a lug on the back of the heel to prevent the spur from falling out of place, or off entirely as sometimes happens.

The box spur, held in the heel by a strong spring and notch, is as rigid as the other, always in place, lighter, more easily removed and cleaned, relieves the foot of pressure and, when nickelled, long retains its brightness.

#### LEGGINGS.

Although shapeless after a rain, they are on the whole a very satisfactory device, in use and appearance. It would be difficult to suggest anything better for foot troops who wear loose and long trousers.

#### TROUSERS.

These should have two hip pockets as well as two front pockets and should not fit too tight about the hips even for riding.

The watch pocket, however, should not be on the waist-band but on the abdomen, 4 inches below waist seam. This enables one to look at his watch without disarranging coat and belt, by the use of one hand; and the comfort of such a pocket when mounted is so great that it is to be wondered this position is not even a common one.

Speaking of watches reminds me to remind others of the watch wrist-strap, which is extraordinarily convenient, especially for mounted officers and for those who write and receive orders or dispatches in the field.

The most comfortable riding trousers are loose about the hips, rather close fitting just below the knee, button close just above the ankle and are held down by an elastic or strap under the instep.

#### UNDRESS COAT.

I have always wondered why soldiers, on land marching and fighting in dust and heat more often than in cold, have, from the earliest days of regular armies and in all countries, been compelled to wear high collared, tight-fitting coats; while sailors, exposed to wind and rain more often than to dust and heat and, as a rule, working in a lower temperature (in the temperate zone) than soldiers, can hardly get their clothes loose enough, or their collars to roll enough and have their chests and throats comfortably loose but much exposed.

If soldiers and sailors were now to be uniformed for the first



time, without knowledge of the past or of precedent, is it not more than probable that the fashions would be much reversed?

Can it be maintained for a moment that a rolling or turned down collar is not more comfortable than a tight high one, during physical exertion? Isn't a landing party of blue jackets better equipped for an assault or for the hot work of serving a light battery, and withal much smarter and jauntier in appearance, than any of our land artillery troops?

A coat with turned down collar can be so made as to button across the chest for protection if needed. The turned down collar does not affect the question of collar ornaments. The Italian army has it universally, collar ornaments included. Other armies have it. We once had it and not so long ago. During my own service as military attaché to our Embassy in Germany my turned down blouse collar was one of the few things of our uniform which the critical German officers found "*ganz praktisch*"—quite practical. As to the general style of our undress coat otherwise I have no suggestions to make except for pockets. There should be four on the outside and two on the inside. An officer in the field needs with him, handkerchief or its equivalent, pad of paper, pencils or pen, maps, may be a note book, surely matches, no doubt tobacco in some form, and a pipe, a knife, a few crackers may be, revolver ammunition, often a Bible or Testament and a picture or two, a hospital case for "first aid to the wounded," and other things not now recalled.

In case baggage allowance is reduced he may need to carry soap, comb, mirror, toothbrush, if so lucky as to have them, and where is he going to carry all these things if he has not capacious pockets and lots of them, especially if he be not mounted? If they be not provided he will certainly improvise them. The first requisite of any hunter's costume is plenty of large pockets; and the undress coat is officers' and men's field coat.

Why even for garrison dress all convenience in pockets for letters or notebook and pencil or handkerchief is sacrificed to the "looks" of a close buttoning blouse.

To be sure, bulging pockets spoil the looks of a tailor's lay figure but are soldiers to be made tailor's models? It is absurd.

The tasteful French people cover the blouse with round braid frogs and hide the openings of the pockets under the frogs. It is true these frogs wear out easily but not much more so than those of the overcoat.

If the difficulty could not be otherwise surmounted why not authorize a blouse for field service like the "good looking" or "military" peace blouse but with lots of pockets?

The present method of buttoning the blouse is perhaps to save life by doing away with the conspicuous row of brass buttons. Why then are not the buttons removed from the blouses of enlisted men?

Finally, is the ordinary single-breasted sack coat of the civilian so hideous with its pockets or with its neat comfortable collar, showing the linen slightly (not out of place in garrison for soldiers); or otherwise impractical that it would not be the best possible model for a uniform undress coat?

#### DRESS COAT.

If vanity demands more than the coat just described, made brighter perhaps with a single or double aiguillette, like the Italian, and brass buttons, why, our present dress coat seems as uncomfortable for the purposes of parades, courts-martial and full dress social occasions as need be designed.

The Italian and Japanese armies and many French regiments have the same style of coat for dress as for undress occasions—adding, however, some gold or silver lace and sometimes aiguillettes to indicate the jollity of the occasion.

#### SHOULDER STRAPS.

Nothing could be more suitable than our present patterns. In Europe (Switzerland excepted) these straps instead of lying fore and aft reach from neck to shoulder. But ours fit more closely, are better adapted to movements of the body and present no obstacle to the putting on or wearing of overcoat or cape.

#### SHOULDER KNOTS.

Our present pattern is unnecessarily ugly, ill adapted to movement of the body, weak in construction, almost a preventive of overcoat wearing, very expensive, and endured so long, it is belied, because we knew of nothing better.

Why is more needed than the present shoulder straps? They are much affected now by certain officers for use on the dress coat for "social" dress, leaving the ugly shoulder knot loop still visible at the neck.

If a special shoulder device for dress coats must be had, we might well adopt the flat European shoulder strap, worn like our

shoulder knot but lying close to the shoulder. It is quite as ornamental as ours, cheaper, and forms no obstacle to overcoats and capes.

Our present shoulder knot is a tasteless corruption of an epaulette without fringe. When the ornaments are of metal it is almost impossible not to tear off some of them by frequently wearing an overcoat.

At any rate, an equally handsome, more durable, more comfortable and cheaper shoulder device for full dress can easily be designed.

But I feel sure that after a little practice in one style of coat only, for dress and undress, our army would be glad of the added comfort and reduced expense.

#### SLINGING THE SWORD.

The Russian method by a belt over the right shoulder, sword at same height on foot or horseback, is ideal. The belt then merely holds the sword to the side and prevents its "whipping" when at a gallop. The belt being then without other load is available for two revolvers and a knife, which an officer in the field needs anyway, and on his person, not on the horse. This Russian method saves fatigue on long marches, and does away with belt pressure on the abdomen, from "thrashing" of the sword at trot or gallop. The sword is also much more easily drawn and returned than by our method. Hooking up and unhooking are done away with and no amount of awkwardness will cause one to trip over his sword.

#### SCABBARDS.

Here there is an opportunity for a great but simple improvement already universally in use in France and Italy.

The lower ring should be moved close up to the upper or abolished altogether.

The lower ring and strap are supposed to prevent the sword from falling in case the upper fastening gives way. But what is the fact? Hold our swords by the lower ring and they will turn upside down and in nine cases out of ten, especially when loose from service, the weapon will fall out. If it does not fall out, the rear strap is so long that the hilt will almost drag on the ground even when mounted.

Undoubtedly the lower ring should be so placed as to hold the sword upright and act as a reserve for the upper ring. The Ital-

ians so use it and the French have done away with the lower ring entirely.

## SWORDS.

Our present patterns are equal to any except for the infantry and staff. Why should they not have a sword that is a sword and not merely a bodkin of no actual use?

The Italian gripe of smooth hard wood, grooved for the fingers is admirable and far better than our wire covered one.

## BELT, UNDRRESS.

A belt of webbing, buckling close to the body is far more comfortable than stiff leather. If the rings of the scabbard be brought close together as they should be, the suspension straps can both be in bearing at once which will save wear on the rings; or the rear strap can be just a little loose so as to come in bearing at once in case the other fastening gives way.

Allien & Co. of New York sell a good model, as good as the Italian.

Attaching the sword by spring hooks, even when they are clamped by a screw nut is not the best way. No doubt the experience of others will corroborate my own in this regard. The hooks *will* unhook.

A small strap and buckle with guard loop will give way only by breaking.

A belt clasp also very often becomes unfastened—a buckle is the only sure fastening.

These suggestions are the fruit of bitter experience and mortification when in the field with German and Italian officers. My sword and belts were new and made by reputable New York firms, but they continually became unfastened or broke and always when I would have given worlds not to have the accident happen.

## BELTS, DRESS.

The above remarks apply equally to our dress belt.

If the same style of coat or blouse be worn for dress and undress occasions, no dress belt will be required and much avoidable expense saved the officer.

## FATIGUE CAP.

Is it possible our present pattern is regarded as a final solution of the problem? It is better than what we had just before,



but no one denies that it resembles that of the New York Fire Department or of the Broadway cable motor man.

The original fatigue cap as used during the war was adopted from the French and was a very practical pattern. But years corrupted its shape until no wonder a change was deemed necessary. But why adopt a "hideosity"?

The ducking helmet protects the neck as well as the eyes but its shape commends itself to no one's taste although its practicality is not denied. No *cap* has yet been devised that protects the neck as well as the eyes. Of all the fatigue caps worn by soldiers, the present French cap is the best and most tasteful. It is roomy, soft and "military" (whatever that may mean). It has a grand visor, long, broad and protective—all that a visor should be. The addition of a pompon or upright bunch of feathers makes it quite dressy for gala occasions—it can then too be easily removed and carried, when in-doors, under the arm—a frequent need of dress head covering. I believe it would give our officers and men universal satisfaction. The Japanese use this method and many Spanish regiments as well as some of other nations.

That would give a head covering suitable for all arms, by varying the colors.

#### DRESS HEAD GEAR.

*Helmet.*—Ours is commonly supposed to be the German helmet but it is as different as can be imagined. The English first corrupted the German shape and we have made the matter worse both in shape and weight. A properly constructed helmet is a very handsome head dress—see the picture herewith of a real German helmet.

The mounted troops suffer more from their helmets than the infantry. It produces headache and is very heavy.

*Chapeau.*—Did you ever see one on a horseman taking a fence in rainy weather? It is an absurd picture. The chapeau is no protection against sun or rain, wind or cold. It is hard to keep on in a wind or at a gallop. As made in this country, it is not graceful and I never heard anything advanced to recommend it for military use. In Europe it stamps an officer as a naval officer. At a ball or opera it is convenient to carry under the arm.

My remedy would be to do away with helmet and chapeau



and adopt the fatigue cap with a light upright bunch of feathers—or a fluffy pompon.

For generals the suggestion is made of a soft felt Prince Rupert hat with gold cord or a long feather or both. Such a head dress is serviceable and very graceful, ornamental and effective.

#### CAMPAIGN HAT.

Our present pattern, in spite of its lack of perfection, is eminently serviceable and I never saw a better.

#### THE SADDLE

is the best in the world (the McClellan) and is complete with its saddle bags and coat straps.

#### BRIDLES.

Ours are not the best. The German and English are better, but I do not feel competent to suggest on this point, for army use. Still an experience with horses from boyhood and what I have seen in other armies convinces me of the correctness of riding as a rule on a snaffle and not on a curb. Martingales should also be permitted when needed, as they are on some horses.

#### SADDLE CLOTH.

Our present pattern, lined with air-tight glazed leather, is altogether wrong. Either that leather should be full of holes or the cloth should have a felt lining.

For a housing under the saddle the German undress pattern of dark blue cloth lined with felt is what it should be. The full dress pattern is worn over the saddle.

An ingenious device to prevent a sword from "whipping" or "thrashing" is to sew a narrow leather loop on the left lower edge of the cloth, well to the rear, through which the sword is passed on mounting.

A pocket in the cloth on the right hand side is a great convenience.

#### OVERCOATS.

Our officer's overcoat is so good it ought not to be tampered with.

But the men's coat can be much improved on. It is still somewhat on the style of the former officer's coat. The skirts afford little protection as they generally blow aside and expose the legs. The collar is not high enough. The cape is an awkward addition even for use as a protection to the head.

The remedy is to make the overcoat fuller and long, down to just above the ankles—with a buttoning strap at the small of the back, a very high collar with a flap to button over the chin and lining throughout. The present non-commissioned officer's canvas overcoat is about the idea. Then button by concealed buttons, put in two deep side pockets with flaps and split it in the back from the bottom up (fastening if desired by buttons) for riding or convenience in walking. Such a great coat not only would marvellously increase the comfort of the soldier but does away at once with any necessity for his carrying a

#### BLANKET

which is unknown to the armies of continental Europe when in the field. When the German army was furnished, a few years ago, with shelter tents it was understood that they were intended for use only in a campaign against Russia where the country is sparsely settled, and the men could not be quartered in villages. But the carrying of a blanket was not thought of. The soldier, wrapped in his great coat with collar turned up, was sufficiently provided.

This considerable reduction in the field equipment is regarded as an important suggestion.

It is true that upon taking the field at present in summer the soldier would probably leave his overcoat behind. But he would take his blanket. Now if he can leave his blanket and take his overcoat instead, he is fitted for all temperatures.

The above remarks do not, of course, cover the whole subject, but this article is perhaps too long already.

The suggestions made certainly have no bias toward copying any one nation. The endeavor has been made to select from the experience of others what can be used to advantage or improved on by us, keeping in view as far as possible the ideal costume and considering how our present uniform can be best altered in that direction.

The changes suggested are in some respects radical, but it is believed that no change has been suggested merely for the sake of change or upon untenable grounds. At any rate, what has been said has sprung from an intense interest in the subject, based on an unusual experience for officers of our army; and from a desire to secure for our army what the Germans so strongly call "*Schlagfertigkeit*," or "readiness to strike."



## BATTLE TACTICS AND MOUNTED INFANTRY.

BY FIRST LIEUT. L. P. DAVISON, 11TH U. S. INFANTRY.

THAT the tactical problem confronting a general commanding an army on the offensive is now more complicated and difficult than it has ever been before, needs only stating to be admitted.

To fully realize this we must call to mind that, during the score or more of years since any great battles have been fought in which the opponents were at all equal either in numbers, discipline or *morale*, and in which it is to be supposed that the plans were carefully outlined and based on scientific principles, numerous and important changes have been made not only in the personnel but especially in the matériel of armies : improvements whose importance can hardly be over-estimated and whose effect on modern warfare, from a tactical point of view, may be likened to that produced by a great cloud of mist which seemingly defies penetration.

The handling of infantry is especially befogged in this connection on account of the different and sometimes contradictory ways in which some of the recent inventions modify the action of foot troops.

A partial enumeration of these changes is sufficient to enforce our argument. They consist of increased facilities for communication, for obtaining and for forwarding information, by means of balloon observations, photographic reconnoitring, better optical instruments, better signal appliances, telephonic and telegraphic improvements, etc. ; increased facilities for transporting supplies and troops, with the probable increase in the amount of supplies and the number of troops ; increased range, accuracy and rapidity of fire for artillery and infantry, with attendant range-finders, special projectiles, high explosives, so-called smokeless powders, flat trajectories, magazine, rapid and machine fire ; individual shields and bullet-proof coats ; better tools for entrenching purposes, with the serious question as to whether field works and hasty entrenchments, by outlining and indicating the extent of the lines using them, will not be a detriment instead of a protection ; emergency rations for troops and animals ; and no

man knows what next. Improvements, or at least changes, all along the line, save perhaps in the absolute capacity of the individual soldier to cover more ground in a given time either on the march or while manœuvring in the presence of the enemy; nor is it at all impossible that constant effort and special training may not have increased this factor to some extent and that it may not be still farther improved when we consider the bicycle and other improved modes of locomotion, the kola-nut and other mooted propositions.

The armies of the world to-day face more new and practically untried conditions than at any previous period of the world's history, not excepting the beginning of that decade of great wars—1861 to 1871. The relative peace interval may at times have been longer, but never before has invention been so active, nor have real or fancied improvements been so numerous as during these last twenty-five years of comparative quiet.

It is generally understood, and indeed so far admitted as to have become almost axiomatic, that these modern changes produce little or no effect on strategy; but every change in fighting matériel has had a more or less important effect on tactics. The government whose armies have been most alert in foreseeing and adopting tactical changes to meet the new conditions has always been well repaid for its vigilance and always will be. Every reader has marked apposite instances of this as far back as the time of Alexander and down to the late hopeless and almost farcical struggle of China against Japan. Gustavus Adolphus, the great Frederick, Napoleon Bonaparte, each in turn made important tactical improvements by carefully noting and taking advantage of new developments. As might be expected, the genius and versatility of the American people is perhaps nowhere better illustrated than with reference to the manner in which they carried on the war so suddenly thrust upon them in 1861. A well-known military writer\* characterizes this war of secession as being "remarkable as a turning point of tactics, there being scarcely a feature of the tactics of the present day† that did not have its germ, its prototype, or its development in that great contest." Taking up the question where we left it in 1865, Von Moltke and other great generals in turn left the impress of their vigorous minds on the subject under discussion until it

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\* Captain Wagner.

† 1894.

would seem that hardly an argument *pro* or *con* can now be advanced that has not already been practically exhausted.

The nineteenth century has been well named a "century of invention," and its last quarter bids fair to overreach the mark, especially with reference to the equipments and accessories pertaining to armies. That these innovations are the cause of a vast amount of disquiet is evident from recent changes in army organization by nearly every great power, by changes in tactics that amount in many cases to a complete substitution of new methods for old ones, by the extensive literature written on the subject, and more recently by frequent articles in the service magazines of different countries which in most cases take the form of personal discussion in which one writer simply endeavors to overthrow the propositions made by another. These discussions, while temporarily confusing, undoubtedly result in much good and will clear the military atmosphere so that eventually principles will be sighted from the enunciation of which proper formulas may be deduced and suitable tactics worked out. The Post Lyceum is supposed to be a favorite method of promoting such discussion, and, while its chief aim at first might have been the education and improvement of the individual officer, it is not at all certain that the scheme has not already attained a higher importance, see Part II., G. O. No. 58, A. G. O., series 1895, in calling forth individual suggestions for the solution of knotty problems. It is greatly to be desired that a suitable organization with its complementary tactics may be decided on during time of peace, and without that fiery birth which so often attends the ushering in of a new status. Experience teaches, however, that all lasting and important reforms are preceded and accompanied by serious upheavals. Thus the evolution of modern infantry tactics is easily traced in successive and vigorous steps from the time of the invention of fire-arms.

The change from the old column formation with its shock action, to the intermediate line formation, and down to the modern attenuated firing line with its supports and reserves has been gradual and sure. Hand in hand with comparatively recent changes in infantry has been the increased effective use of cavalry in screening, outpost, and various other duties for which it is so admirably suited, and this tactical growth in both infantry and cavalry has been brought about in a marked degree by the steady improvements in artillery methods.

To the fact that the Prussians not only foresaw the necessity for tactical changes, but in time of peace worked out new methods, actually adopted them, and put them into operation, must be attributed their overwhelming and decisive victories. In the Austro-Prussian War the contest was to some extent unequal on account of muzzle-loaders on one side and breech-loaders on the other; but in the Franco German War the "Chassepot" was superior to the "Needle-gun" in range, accuracy and rapidity of fire, yet the Prussians again won. The facts in the latter case are that the French were particularly at fault in not having a more clearly defined tactical system, better suited to the then modern conditions. The Germans had more carefully studied the lessons of the American struggle, had adopted the tactical methods suggested by recent improvements, and by their familiarity with the subject were able, during the progress of a spirited campaign,\* to devise new battle tactics which caused the terrible fire of the French to be much less destructive. Ever since the Napoleonic wars the theory of French tactics had been one thing and the practice quite another. They rested in fancied security on a sort of race prejudice, a thing not altogether peculiar to France. It was another beautiful illustration of the hare and the tortoise and was a rude awakening for the French.

This war, and other smaller engagements later on, gave renewed impetus to the idea of attenuated lines and extended order with its system of supports and reserves as a means of avoiding the disastrous effects of modern fire. But the question that is now beginning to agitate thinking and observant military students is whether the pendulum whose swing was started in this direction by Gustavus Adolphus and Frederick the Great has not already gone too far. Must we not return to some more tenable middle ground and, if necessary, introduce some new tactical factor to overcome the existing difficulties?

Almost every writer on this subject, almost every officer of experience and nearly every military student, either states outright or allows it to be understood that modern tactical methods for infantry are at least insecure if not entirely impracticable. This is believed to be true of all infantry tactics at the present time, Germany's not excepted. It is to be presumed that, when our own infantry tactics were remodelled by officers who were experienced, liberal minded and progressive, all existing

\* St. Privat and following.



methods were thoroughly investigated, and that our tactics can safely be taken as a fair representative of the most modern ideas and developments. But let any well-informed officer, either with or without actual battle experience, observe a battalion of our infantry forming for and moving forward in attack. No matter with what precision the lines laid down in the drill-book be carried out, can that officer help wishing that he had a company at the objective point with which to overthrow the combination? Is there any officer who does not believe that with good discipline and plenty of ammunition he could more than hold his own?

While it is not intended in this paper to make a detailed criticism of modern infantry battle tactics, a few of the most apparent defects must for our purpose be noted:

1. Only from one-third to one-half the men under galling fire are in a position to return that fire.

2. The men of any one organization actually firing are so extended as to render control difficult if not impossible even on the drill ground, and this defect is felt much more keenly when attempting to work out problems in minor tactics.

3. The firing line, supports and reserves are too scattered to be under the immediate direction of any one officer. If these defects are so apparent in a battalion of four half-size companies on drill, what can be expected in large commands and in more complicated engagements?

4. The officers are scattered quite as badly as the men, and, without that complete understanding which is often impracticable and sometimes impossible, the lieutenants cannot always grasp what the captain desires, and it appears also that the captains frequently fail to comprehend what is desired of them by the major.

5. If in battle the captain himself feels the need of a close and constant support on the part of his lieutenants, what will be the condition of the non-commissioned officer and the private when the physical and moral support of his officers on which, despite our best efforts at training, he is and ever must be so dependent, is withdrawn? With the three officers allowed to the present company there are none too many, but what will happen when the company contains a hundred rifles and when the captain commands the regiment and the 2d lieutenant of firing line fame commands the company? It is a beautiful theory, this of making "the man behind the gun" independent, or only depen-

dent on his neighbor in the ranks ; but have we ever had or can we ever get such men in the ranks ? This independence might possibly be hoped for in the case of carefully and continuously drilled regulars, few really expect it ; in case of volunteers and militia we know it cannot even be hoped for until after they have become veteran troops by two or three serious engagements and everything now points to the fact that two or three contests will practically settle any future war. The tactical handling of infantry to-day is not only a puzzling question, but a painful one ; too many officers of both high and low rank seem disinclined to look the facts squarely in the face. Recapitulated, the difficulties may be stated as follows :

Lines, in order to withstand the expected fire, are extended and separated until control, unity of action is lost ; a majority of the men under fire cannot return that fire ; and the firing line is too weak per unit of length to accomplish the desired object when it does, if ever, come within striking distance. The result will be, say officers of experience and foresight, that the supports and reserves will rush on to the first line, it being an observed fact that men instinctively go toward the fire that affects them ; that they will get there early in the engagement, but without orders, in a confused, irregular mass ; and with no one there competent to give either example or orders. When it is asked—"Why not give these men the ultimate formation from the beginning but make it regular, strong enough and dirigible?" the answer is, that such a formation would be annihilated by the enemy's fire on account of the length of time necessary to cover the required distance. Choose your own horn of the dilemma ; one seems quite as bad as the other.

Artillery, from its smaller numbers, more definite objects, more mechanical duties, better organization, greater comparative number of officers ; from the distinct nucleus which its guns form for the men, and possibly from the more scientific methods used by its officers, is not in such a bad way tactically.

Cavalry, for many of the above reasons, which are only hinted at, and for the additional reasons that it is seldom under long continued fire, and that whatever is done is accomplished with a rush and under circumstances calculated to bolster up physical and moral courage, seems also to have fairly appropriate tactical methods.

But has the infantry which is to bear the scorching of well

directed and continuous artillery and infantry fire, and the unexpected crush of the cavalry charge ; which carries its own impedimenta, its own ammunition, and often with the fear that this is its only supply, which is to be used like the quartermaster's department, for "all other purposes" ; which when, in the firing line moving from cover to cover, must be mindful that projectiles whizzing noisily if harmlessly by will find their mission in cutting down the exposed reserves upon whom its own safety and the final victory or defeat depends ; has the infantry such organization and tactics as to assure it in the bloody trial ? Is it not a fact, a fact not much written about to be sure, but admitted by old and experienced officers, that, while the artillery has a well planned and often secure position, a definite object to perform in a carefully detailed manner ; while the cavalry is properly preserved in chosen places until the "critical" moment of its "usefulness" ; is it not too often the fact that infantry is brought on the field with only a modicum of forethought and preparation, and that after the battle is once fairly under way about the only tactics known is,— "Go in boys, go in and win" ? They do "go in", and they go through too ; they come out sometimes roughly handled, but ever ready to "go in" again. If victorious, is it not more often good luck than good tactics ?

In this connection I wish to quote from the annual report of the Inspector-General to the Lieutenant-General commanding the army, for the year 1895, which has been received since the completion of this essay. Beginning with the last complete paragraph, page 13, we read :

"In concluding this portion of my report, it is incumbent upon me to say that so far as my experience enables me to form a just judgment the system of extended order drill exercises, as prescribed in our drill regulations, does not give promise of good results when brought into play in face of an enterprising enemy. Even on the drill field there is a want of coincidence and harmony of action that is disconcerting and confusing, and I think some simpler method that insures unity of action should be diligently sought. \* \* \*

"In a month after a campaign actually opens, the company will, judging from well-established historical experiences, fall to between sixty and eighty men. This is too small a unit to operate with in the manner prescribed in our drill regulations. Their exertions would be expended in weak attacks, without coinci-

dence of effort, and would invite defeat; whereas heavy blows, well combined, promise success. Now, with companies so small that independent efforts are unwarranted, we must look for some other method. In studying this problem I have convinced myself that the safest course for us to pursue, national politics and army officers both considered, is to restrict our companies to such a number as can be well managed by company officers and make a combination of these companies for the working unit. In other words, take the battalion of four companies as the unit in battle, and have this unit directed by a chief and staff. This in all probability would eventually lead to the formation of regiments of four battalions each, but that would be a matter for future consideration. The necessity now is to obtain a system of drill that can be made applicable under fire."

This is strong language for a report of this character, and, coming from such an authority, it must be accepted as a fact, and furthermore, as a fact stated in about its mildest form.

Accepting this state of affairs as a fact the next thing to do is to act.

Why is infantry thus handicapped? The best military minds in all ages have given this subject the most careful thought. It is simply because this is the broadest and deepest of all military subjects, the first to be affected by any change, the one calling for the most diverse expedients, and the one which will always present new phases; a subject that in reality overtops and embraces all others. The handling of artillery is important and often decisive; cavalry plays a rôle that can be delegated to no other troops; but mastery of the infantry problem is the *sine qua non* of a successful campaign. Consideration of its proper organization and employment opens up such a wide range of possibilities that little more than generalities has ever been attempted.

In discussing any subject it has ever required less ingenuity to tear down than to construct, it is more easy to find fault with given conditions than to suggest rational means of improvement. We are all too ready in pointing out the shortcomings of existing systems under which we find ourselves and too slow in giving them serious thought and honest study with a view to their betterment. Never has there been more urgent need for careful investigation of tactical methods than at present. Burdened as we are with an obsolete organization to which are being adapted, Procrustean like, the most modern experiments in tactics, it is



high time the United States infantry should make some enlightened, concerted attempt to remedy this "new wine in old bottles" condition. We should rightly have great confidence in American infantry and firmly believe that, in case of our becoming engaged in a great war, new battle tactics suited to present conditions would ultimately be evolved which would again be the world's recognized standard for another quarter century. This result would be attained, however, as in 1861-65, by the sacrifice of thousands of lives and millions of treasure. In view of past experience this sacrifice would be culpable negligence. If we are able to solve this problem, how shiftless and selfish of us to rest on our real or fancied capability and not to bestir ourselves until war forces the required activity. We proudly claim to be a "practical" people, and there is good ground for this claim, for where the incentive is great enough, we are to-day solving the world's practical problems. Why not then as infantry officers seriously attempt to settle some of these military questions? Why not be stimulated by professional pride and patriotism rather than to wait for the iron goad of war? We have lazily adopted German methods instead of going back to their data and deducing methods suited to our own needs. Shall we allow that the Germans learned more from our own war than we ourselves? Rather let us take the lessons of the Franco-German War and by adding our own experience and by making allowances for modern improvements deduce our own and possibly better results than the Germans themselves.

Von Scherff ably summarizes the Franco-German War by saying that the enemy's position, no matter what its particular form, "was invariably carried by a swarm of skirmishers, followed only at greater or less distance by lines and columns in close order." This statement is deserving of the deepest study. It is full of significance not only as a radical truth, stated by a competent observer, but especially as giving in a nutshell the tactics of the last great war; a war hardly equalled in decisiveness, completeness of detailed arrangements, and for generalship."

"A swarm of skirmishers" in advance, followed by "lines and columns in close order"; this may well serve as a military text. This is a direct result of carrying Napoleonic methods and methods practiced in our Civil War to their logical conclusion, at the same time making due allowance for intermediate improvements. But Von Scherff thus summarizes a war that occurred

twenty-five years ago when the effective range of the best rifle was but thirteen hundred yards, that of field artillery much less than now, and when rapidity of fire was not to be compared to the present rate. Nearly all the conditions are changed and we are assured again and again that "lines and columns in close order" cannot live under modern battle conditions. To say nothing of improved artillery, modern infantry fire is now effective at over two thousand yards, is murderous at one thousand to twelve hundred yards, and simply annihilating at from three to five hundred yards. The rapidity of fire is limited only by the possible supply of ammunition and by the physical endurance of the soldier.

Starting at two thousand yards it takes infantry over twelve minutes to reach the one thousand yard point and, under the fire that would be brought to bear, it would take infantry at least fifteen minutes more, if not longer, to reach the point from which a charge could be made.

We know that infantry in close order cannot survive twenty to thirty minutes of this expected fire, and that it is a serious question whether infantry in any but the most extended order can make it, if at all. If the order be thus extended, control of the line is lost and when it arrives at charging distance, there is not enough cohesion and weight to accomplish the required object. The supports and reserves cannot be brought up in close order and are subject to the same objections that apply to the first line, if in extended order, with the additional objection that they cannot return the fire that is cutting them down. The first extended line and all subsequent extended lines will go about where they please or where the weight of fire and the character of the ground forces them: the individual soldier is in command, practically every man for himself, and no matter what his state of discipline, each can see and judge of but a small part of the battle conditions.

Typical battle tactics would seem to consist of 1. Throwing forward as strong a line of skirmishers as could live under the particular fire in question, and, when this line shall have reached an advanced position from which effective work can be accomplished, 2. Reinforcing it at special points of attack with fresh troops in the most compact order practicable, which should be close order if possible.

This simple plan immediately appeals to the common sense of

every officer. It is not at all new, for probably four out of every five great battles have been won on this general principle : 1. An advance line to engage the enemy, and 2. Reinforcements thrown in at the proper time at the proper points.

Now, without being unduly overawed by the apparent impossibility of carrying out the second portion of this plan under existing circumstances, let us make a careful study of these two general points, applying modern conditions.

1. This advanced line or "swarm of skirmishers" as Von Scherff calls it, should, in accordance with well-established principles, on which it is unnecessary to dwell here, be composed of entire organizations with their full complement of officers. The company officers must be practically right in the line of skirmishers, for the purpose of encouraging and supporting by their presence quite as much as for giving their personal supervision to every detail. If captains and lieutenants are important in time of peace, then during campaigns and battles they must of necessity be much more important. But while in time of peace the company officers can and should stand somewhat aloof and govern their organizations through the prescribed and customary peace-footing channels, in campaigns and on the battle-field they must be component parts of their commands, in actual close contact with their men, controlling and directing by example as well as by precept, instead of governing from a distance. In garrisons, captains and lieutenants are rightly shown great consideration and are quite important personages individually, but in war they must be considered simply as necessary adjuncts of such and such a company, and cannot be considered personally or individually or apart from their company. The company can and should be made the reflection of its officers and each subaltern should have a part to fulfill, as is wisely made obligatory on the company commander by par. 255, A. R., 1895 ; hence, also, the greater necessity of the company being kept well together and the company officers being immediately in rear of their companies, instead of the company being widely scattered and the officers being from fifteen to one hundred yards away. This in turn gives the major better control and if he cannot properly direct the action of four full strength companies, he should be given but two or at most three. The major, again, being more or less a component part of his battalion and governing by his personality as well as by his orders, must be closely in rear of his command in order to have

complete control of it, and in action must of course be dismounted. A two or four battalion organization would seem best suited for this purpose and if there are four battalions, a lieutenant-colonel should command each wing. By the same reasoning the lieutenant colonels and commander of the regiment should not be very far behind the line of majors. The failure to keep a full number of officers with a regiment during a campaign is generally due to shiftless methods rather than to lack of material and is extremely poor economy. If a full complement of officers is ever needed it is especially imperative in actual battle. In short, to fulfill the first part of the proposition, if the advanced line has to be less dense, send forward a less number of organizations, but have each complete as far as it goes and intact, just as they are on the march and in camp, habitually; then will be realized the full force of their discipline and *esprit de corps*. On the other hand our present formation gives an appearance of, if not in reality an encouragement to, a sort of straggling or shirking of duty and leaves too much to be expected and demanded of the individual officer or man. Drills and marches and campaigns are frequent (though perhaps not enough so) compared with battles; therefore the more reason men should have the same formation in the supreme trial for which they are being educated by years of discipline, that they have in the routine of every-day life.

2. Admit, for argument's sake, that fresh troops in close order cannot be brought up to reinforce the above described line on account of the time required to cover the distance to be marched. Admit that under present conditions the time these supporting and reserve forces would have to be under fire would be long enough for their demoralization if not annihilation. What is the crucial point of the objection? *Time under fire*. Since we cannot hope to sufficiently reduce the enemy's fire by our own, *time* is the matter on which the whole question hinges; hence *time* is the Gordian knot which must be cut. Common sense would suggest that as we cannot materially reduce the enemy's *fire*, we reduce our own *time*. That is the only logical conclusion. There seems but one way to accomplish this object, viz., to *mount* the supporting and reserve *infantry*.

This, it is believed, will make possible the second part of our general proposition.

Mounted infantry has been used in cases of necessity, for special purposes and in limited numbers on numerous occasions



and over a considerable period of time. The English, and perhaps some other nations, have made a start at its permanent organization. But nothing, so far as I can find out, has been attempted, or indeed foreseen, on the scale herewith submitted.

It is not thought necessary, on account of its previous and present limited uses, to go into a detailed discussion of the existing organization and tactics of mounted infantry; it makes up a very small part of the present battle tactics. In future, however, from our point of view, mounted infantry must form the bulk of the army and be the main reliance of the commander.

Speaking of mounted infantry, Shaw says: "The advantages of a force of this character being made a part of our field army will sooner or later be acknowledged, but the functions of the force must be clearly understood before its value can be fully realized." Of these functions Shaw only mentions two, viz.: 1. To enable infantry to act with cavalry, and 2. To perform certain duties in the absence of cavalry. These two functions when closely considered, mean one and the same thing, and that is, to utilize mounted infantry for cavalry purposes. This idea is not to be entertained for a moment. If any army has not enough cavalry to properly perform its special work, its cavalry should be increased, which, however, is not the point being argued here. Neither the infantry nor the cavalry should be handicapped with such a proposition. This would be poor economy, for it would probably result in spoiling good infantry to make but indifferent cavalry.

Infantry does not need to be mounted because it is disinclined or unable to march; history teaches us that. But infantry in support and reserve does need to be mounted simply and solely that it may be brought to an advanced position, already partially held, in eight or ten minutes time instead of twenty or thirty minutes. This seems to be the main, and an amply sufficient reason, for mounting the infantry. Time and trial will probably be required to substantiate the truth and feasibility of this proposition; in the meantime its reasonableness may be discussed.

Shaw further states that "As soon as the advantages are felt by commanders, of the rifle being well to the front in all field operations, means will, no doubt, be improvised during the campaign for moving infantry quickly," and he very pertinently adds: "But it is better to consider these matters in advance in time of peace, to avoid necessity for shifts and expedients in time of war."

It may not be necessary to mount all the infantry, two divisions to the corps might suffice ; this, however, is a matter for later consideration. Take an army corps and consider the twenty thousand (more or less) infantry composing it. Mount this infantry on small, strong, enduring and docile pony horses. This horse is so gaited as to make five or six miles per hour, which means thirty to thirty-five miles per day, for long continued periods. Do not attempt to make cavalry of this force, but simply teach it to use the ponies as transportation for the men, their arms, ammunition and equipments. The only mounted drill to be taught is to ride in column or in line and to dismount and form in front.

While more or less closely identified with the command of thirty Apache Indian scouts for a good part of three years, I attempted to teach them nothing more in the way of mounted drill. Their ponies, selected under careful supervision, are almost the typical animals for mounted infantry. They will carry an ordinary rider over very rough ground at the pace above mentioned and I have repeatedly charged the detachment over country ordinarily considered impossible, without injury to either scout or pony. These scouts were mounted infantry pure and simple, and after charging a distance of a thousand yards could halt and form line to the front at command in an incredibly short space of time, the ponies being turned over to scouts, who remained mounted, at the rate of ten ponies to each scout, these took the herd to the rear, over the same ground and at the same gait as they had advanced, viz.,—about one thousand yards in six minutes.

There need be no confusion while dismounting and forming line and the ponies very soon learn what is wanted of them. Any company of infantry can be taught the same thing much better, for the Apache Indian is not a natural rider but a footman. It is thought that *battalions* of mounted infantry in support and reserve can be thus brought into action without difficulty, and that by this means the advanced line can be reinforced at desired points in an effective manner.

Of course somebody is going to be hit during this six or eight minutes ride to the front, but after the men are at the front, they are fresh for the work, in good order, elated with the rush and eager for fight.

During this reinforcement, the charging mounted infantry is bound to monopolize the attention of the enemy so that the first

line will be free to advance and pour in an unopposed rapid fire of such a character as will materially check, if not altogether disconcert the fire of the enemy who, having to fire at an objective whose distance from them is rapidly changing, will be able to accomplish only a fraction of the damage that would result to slowly moving foot troops for the same period of time.

Battalion after battalion can be thrown forward in this manner with minimum loss and the infantry be placed exactly where they are required, and at the critical moment. These fresh troops will arrive at the advanced position with plenty of nerve, without fatigue, with plenty of ammunition and without being demoralized by their losses, however serious they may be. Men do not heed casualties under such circumstances.

Consider for a moment the *morale* of troops in the advanced line when they know that they are being supported by such troops, when they know that at the right time and in the right places they are to be reinforced in such a manner that it will give them the highest possible percentage of chances to win. Consider, also the spirit aroused in troops thus called upon to succor their comrades of the advanced line. Does not this plan bring to the front all that is held highest and noblest by the soldier? Can you imagine any conditions under which men will fight better?

Imagine an army, behind its cavalry screen and its advanced guards, that has at last manœuvred the enemy into a position where, from inferiority of numbers, lack of supplies, protection of base, or any other reasons, it must act on the defensive. The cavalry has fallen away to the right and left to protect the flanks, the advanced guards have reconnoitred, sent their last information to the general, and taken up such positions as to cover the army and force the enemy to develop its defense. The leading divisions of infantry dismount as soon as they come under fire and the leading artillery begins ranging for the enemy and to take position for the battle. The leading divisions move forward on foot, accompanied as closely as is practicable by their mounts, until compelled by the enemy's fire to extend, and in the meantime the reserve artillery comes up and enters into its share of the fight, advancing according to its present tactics for the various stages of a battle. The commanding general by means of the reports received, balloon observations and so forth, has knowledge of the exact position and strength of the enemy, and by means of field telegraph and other signal corps appliances, is in

constant communication with his batteries, the supporting and reserve infantry and the cavalry. The advanced line from the leading divisions, meanwhile, is working its way to the front under such cover as can be found and the artillery duel is in full blast. The reserve infantry, mounted, and such cavalry as is available for this purpose, is favorably posted for supporting the attack and under cover of the artillery fire, and that of the advanced line can probably work up to within ten or twelve hundred yards without serious loss or inconvenience. If the artillery is sufficiently in force, advantageously posted and is properly performing its part, the enemy's fire is somewhat under control and the "swarm of skirmishers" is working well up to the assaulting position.

The general now understands, by the developed fire and the extent of the enemy's lines, where the feints and where the main attack or attacks should be made, and notifies his subordinate commanders where and when to throw in their divisions and brigades. The mounted infantry supports move out at command and drawing the enemy's fire from the advanced line, the latter prepares for rapid fire and the final struggle. Now is the grand trial. Battalions, brigades, divisions are whirled to the front at a gallop along such portions of the line as it is desired to reinforce, and arriving at the advanced line after a thousand yards' dash, lands on its feet and the enemy is charged.

While the entire battle has lasted for some time, the critical period, during which the entire forces have been in action and under fire, is over in eight or ten minutes. During this crisis terrific slaughter will take place, but not more and probably not as great as suffered in former battles and under former conditions.

The true infantry reserves are in such position as, with the cavalry and reserve artillery, to cover the retreat in case of defeat or to quickly take advantage of victory in case one is gained.

Briefly stated again, the idea is as follows :

Take Von Scherff's summation of the Franco-German War as an established fact, viz.: that their battles were won, and under the nearest to present conditions that we have seen tried, by "a swarm of skirmishers" followed by "lines and columns in close order." From that and other general data deduce the typical and common sense method of sending forward as strong an advanced line as the ground and the character of the fire will permit, reinforcing this line at proper points by sending mounted infantry quickly to the front.



This plan admits of all the varieties of attack and offensive defense, being especially adapted to flank and turning movements. Is it or is it not a reasonable plan, whereby under present conditions a sufficient force can be gotten within striking distance of the enemy's position? Does it in any way suggest the solution of, or materially modify the problem of how to get over the terrible "last five hundred yards" at which all other systems apparently stumble? Does it not also practically solve the "supply of ammunition" problem, and materially modify the question of manœuvring and concentrating troops? No plan is to be lightly cast aside because it is new, nor because submitted by a junior. This seems a bold scheme and a radical change, but the radical changes in conditions demand radical methods. The battle proper will be won or lost in a short space of time and consequently every move must be well planned, without hesitation, fearless and decisive.

From lack of time and from some little respect for the proper limit of a lyceum paper, no especial attention has been given to the possibilities of this system in defensive operations, but it is believed to be worthy of serious consideration and development.

In the above briefly and imperfectly outlined system one of the first considerations is the infantry mount. These pony horses should be specially reared on parts of the public domain set aside for that purpose, and bred from carefully selected animals with reference to endurance and docility (teachableness). This style of horse is not selected as a cheap expedient but because such pony horses come nearer to fulfilling all the requirements of an infantry mount than any other. After being assigned to the company and battalion they should have frequent, indeed daily drills, each drill concluding with the charge and dismount, after which the animals should invariably be herded to the rear at the same gait and over the exact ground covered during the advance. Regular systematic training and drill will do as much for the horse as for the soldier.

Of apparent objections to this organization, one of the first to strike the military student is the question of forage. During peace this comes under the head of cost of maintenance, but during campaigns it has an important bearing on transportation. Army trains are already large and the proper supply of an army in the field is a problem of such magnitude as to require special consideration which cannot be given here. It can be

noted here, however, and urged for further consideration, that railroad facilities have increased so enormously since our last wars, and were made so much of during those wars that the problem is in reality more simple than at first glance appears. There is now hardly a section of any great extent in civilized countries which is not well served by existing railroads, and both commercial and military railroads are constantly being added to the present systems. These must and will be utilized to the fullest extent possible in future wars. No force can guard and repair them to greater advantage than this same mounted infantry. Then, too, these infantry mounts will require only about half as much forage per animal as is used by the present cavalry mounts. The ponies themselves will carry much of the ammunition and impedimenta that now have to be transported by wagon, thus tending, in this particular case, to lessen the size of trains and to greatly simplify the important and puzzling questions of supplying the lines with ammunition and taking care of the wounded. Moreover, while emergency rations are being considered for the soldier it might be well to also look for suitable forage in a condensed form.

A second objection will be the lengthening out of marching columns due to having troops on horseback instead of on foot. When it is remembered, however, that these ponies travel without difficulty over ground where foot troops could proceed but slowly, if at all, and that, in consequence, mounted infantry could march in a greater number of parallel columns, practically independent of roads, this objection almost disappears.

Original cost and expense of maintenance is another objection. These horses are cheap and will undoubtedly be cheaper. Suitable mounts could now be purchased for from ten to twenty dollars each, and if the Government should take hold of the matter properly, utilizing some of the "Wards of the Nation" which are now giving it considerable anxiety and expense, the cost of these mounts might, it is thought, be considerably reduced and at the same time present an additional factor in the solution of the Indian question. Forage is also becoming less expensive as the place of the horse is being filled by other means, and in the form of grain-hay,\* etc., can be produced to advantage where other crops now pay but poorly.

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\* Wheat, barley or oats cut just before it is ripe : a good combination of long and short forage.

Other objections and, it is hoped, other advantages, will arise, not mentioned in this paper and possibly not now foreseen. But again it must be remembered that all other necessities must give way, all obstacles must go down before the dire necessities and demands of war. It is believed that the bicycle will be brought in to help and perhaps to somewhat modify this system, although to what extent cannot now be easily foretold. Bicycle corps are mounted infantry in the best sense of the term, and where they can be used, and the limits of their functions is being rapidly and, it is hoped, satisfactorily determined.

This review of the present situation does not pretend to be exhaustive, and the expedients set forth to meet the changed and still changing conditions have not, for lack of time and data, been considered with that attention to details which the subject warrants. The attempt is made to but roughly indicate a suitable organization and its required tactics for getting the infantry supports and reserves over the deadly space between twelve hundred and one hundred yards, in good order, in the minimum time and without annihilation or demoralization, barely pointing out a few of its tactical possibilities with reference to the great infantry problem. Crude as they are, however, these ideas are set forth with a firm belief in their necessity, utility and practicability, and with the hope that intelligent discussion may be healthfully stimulated in this direction and perhaps ultimate advantage derived.

As long as there shall be a scientific profession of arms, one of its main duties may be summed up in the dictum, "In time of peace prepare for war." Many agree that this mania for preparation has already gone too far; its constantly increasing burdens are now more than ever before being felt and considered by the peoples of many nations. But as long as the belief exists that future wars between civilized powers are inevitable, just so long must these burdens be borne; and they must increase in about the same ratio as new developments in arms and armament increase.

If the whole system shall at last fall to the ground of its own weight, no class will hail that epoch with greater satisfaction than the true professional soldier.

## ARTILLERY FIRING CHARTS.

BY FIRST LIEUT. H. A. REED, 2D U. S. ARTILLERY.

**I**N August, 1896, at Sandy Hook, N. J., I was in immediate charge of the preparation of an artillery firing chart for use by the artillery battalions during the ensuing month. In preceding years I had made several of these charts for use in target practice at different posts ; but, in their construction, prevailing methods of copying, compiling and consequent inattention to strict accuracy were followed and attached to the work ; however, they were probably as accurate as were many of the observations taken of targets and splashes of projectiles during the corresponding practice. But, for the Sandy Hook practice of 1896, some of the largest and best guns in the service were to be used, the ranges far exceeded those hitherto fired over, and it was necessary that a chart, for this occasion, at least, should not be wanting in accuracy or found inconvenient in use.

Two officers and four enlisted men were employed in the work. The time allowed before the arrival of the first battalion for practice was 26 working days. The temperature at first was excessively high and, on account of haze and fog, but few days permitted of observations from the most distant stations.

The work was greatly expedited by the adoption of a side of a U. S. C. & G. Survey triangle for the base of the triangulation. Its azimuth, length and terminal stations were given on a tracing from the original map, furnished by the C. S. Bureau on application made by the C. O. of the first battalion under whose direction the chart was made.

The field work began by the occupation of these terminal stations, and transit measurements of the angles between the base as a side and lines to all points likely to be used in the triangulation ; and was extended to occupation of the selected points, and the direct measurement of all the angles of each of the triangles. There was no indirect measurement, such as, for instance, determining a third angle by subtracting two measured ones from 180°. Each angle was measured at least twenty times and some of the angles sixty times. The maximum error in the closing of a tri-



angle was 8 seconds,—inappreciable with the scale used. The triangulation closed on a measured base.

The subsequent office work was lessened by sighting, in the field work, on signals erected at the instrument stations, at the plumb-bob point, thus obviating the use of formulæ for reduction to centre of station.

The triangulation adjusted, the angles and their tangents tabulated and the scale, 1-7200, selected, the survey was then plotted in pencil on the cloth-backed paper in common use at army posts. It was found impracticable to stretch this paper tightly enough to produce a perfectly plane surface, so unbacked paper stretched while moist would have been better. The middle point of the paper determined, two right lines intersecting at this point were accurately constructed at right angles to each other,—one approximately parallel to the longer edge of the paper,—to serve as axes or base lines for all construction measurements. Each of these axes was divided into 2-inch parts beginning at the middle point,—the beam compass being first used to set off multiples of these parts, conveniently near the edges of the paper, to serve as checks in spacing. Very fine right lines were then drawn through the points of division, thus subdividing the sheet into 2-inch squares. Single squares and groups of squares were then checked by diagonals and errors corrected. As the targets were to be on the water, the land representation was so disposed as to give as large a field of fire on the water as possible, and so that the observing stations would command this field. Angles were plotted by tangents of 1000 yards radius,—the circular protractors issued to posts being of course too inaccurate for the purpose.

It was decided that true azimuths instead of “base angles” should be used in the target practice. To facilitate this, four arc-scales were constructed with radius of about 40 inches, and the two observing stations and middle points of the two batteries, from which the firing was to take place, as centres. To graduate each of these azimuth measuring arcs accurately, it was produced to include a quadrant having one extremity at the south; this was spaced into ninety equal parts, each of these into ten equal parts and the subdivision continued until 5-minute arcs resulted, which were about 1-16th of an inch in length; so single minutes could easily be estimated; and one minute at the extreme range prescribed—8000 yards—corresponded to but 2 and 1-3 yards. This subdivision was checked by comparing diagonals of groups

of equal numbers of subdivisions. Each arc was designated by the initial letter of the station used as its centre,—in large type and conspicuously placed near its middle point, so as to quickly attract attention in the hurry of practice. The whole-degree divisions were numbered. As there was an azimuth arc for each battery, either one of the corresponding centres could be used as a third observing station as a check for accuracy.

The 2-inch squares in that part of the chart containing the field of fire were subdivided into 1-inch squares, and the penciling was then inked and marginal numbers added in accord with existing orders. Silk threads pivoted to needles at the station points, and lead weights covered with silk of different colors, were used in marking the lines of direction as observed at and transmitted from the stations,—a piece of rubber band being introduced in each thread to prevent disturbing the needle to which it was attached.

For measuring ranges with the steel rule, the large opening at the pivot was filled with wood and a needle thrust through it, for use instead of the coarse plug which is issued with it.

In the foregoing description may be noted some departures from the method employed at most posts in the preparation of an artillery chart for target practice, but there is of course much room for improvement.

G. O. 108, A. G. O. '88 was issued when the 8" C. R. was our longest range sea-coast gun. Three miles from the battery was the lowest limit of the chart field and the scale prescribed was 1-3600, or 100 yards to an inch. Now this limit, for an all around fire, as at Fort Warren, or Alcatraz, would require the chart to be about 9 feet square, or a circle of 53" radius. It is readily seen that a chart of this size is altogether too large to work over conveniently,—to lean over and make adjustments, or measurements, at or near the centre. Of course for a narrow field it might serve, and the larger the scale the greater the accuracy; but for a range of 5 miles and the resulting map, nearly 15 feet square, the scale prescribed in existing orders is evidently impracticable.

These orders require that the base lines used in artillery target practice shall be plotted on the post chart, which is also to show the soundings within range of the guns, and the shoals, reefs, islands, light-houses, beacons, etc., which may be useful in quickly determining distances; hence the post chart is not in-

tended for target practice alone, but is evidently to serve for the accurate location of every fixed and movable object within range of the post batteries. A chart with prescribed scale conforming to these conditions for Fort Schuyler armed with the 10" B. R. gun, would be 28 feet in length, or over 15 feet, if the fire was to be but in one direction. For target practice only, a narrow strip containing base line and target, with a sector large enough to show deviations, stretched on the floor of a large room might be handled, but the work would hardly be considered of a rational character.

Evidently the scale must be reduced and very much so for target practice work.

The Sandy Hook chart constructed to a scale of 1:7200, or one half the prescribed scale, limited the field of fire to the S. W. quadrant; and its border dimensions were about 50×60 inches,—just about the maximum size to work over conveniently.

The choice of a suitable scale for firing charts is apparently of considerable importance. 1:10,800 gives 300 yards to an inch, and a 60th of an inch division, which is quite easily read, gives 5 yards,—about the tangent of 1 minute for a ten mile radius. This scale, or one of 400 yards to the inch, which would work better with the steel rule now on hand, seems about right for our new long range guns. The chart used with the Lewis range-finder, for long ranges, is 400 yards to an inch.

I am informed that a system of polar coördinates for plotting shots, etc., has been very recently approved by the Secretary of War, but the order for its introduction has not yet been issued; so the triangulation method being still in force, there are some suggestions concerning it that might prove useful.

True azimuth measurements afford many advantages. The true azimuth of a point given, an approximate idea of its direction is at once communicated to any one knowing the points of the compass. There is no confusion resulting in choosing the right direction or the side of the datum line on which to lay off the angle; *e. g.*,—with base angle measurements, which are still in use at some posts, the numerical value of the angle must be preceded by the proper sign to insure its correct plotting. This cannot happen with true azimuth angles because they are always measured around to the right, and no sign or explanatory note is required. Besides the U. S. C. Survey triangulation is

based on this method, and a tracing received from them becomes immediately available for the purpose required.

It is generally conceded that silk or fine wire threads used in conjunction with arcs of much greater radii than those of the metal protractor give the most accurate results in plotting of the various schemes extant. Now the construction of these arcs on the chart is a very nice operation, requiring much time and labor; and it is necessary to make new ones whenever the centres of observation are changed; besides, the effect of heat and moisture is to warp the chart and otherwise vitiate its accuracy. To obviate these difficulties it is proposed that three metal azimuth arcs,—one for each observing station and one for the gun,—be furnished for each plotting board. The base, gun and line of fire having been represented on the board and the required azimuths known, the arcs are placed in position and secured either by tacks, screws, or by pressing points projecting from their lower surfaces into the board, the silk threads are then used as is customary in measuring the angles. The arcs may be 1 ft. long,  $\frac{1}{2}$  an inch broad and 1-20th of an inch thick. This length with a 34.48" radius would give about  $10^\circ$  on each side of the line of observation, sufficient for deviations in the wildest shooting; and subdivisions of 1-50th of an inch would give  $2'$  readings, from which  $1'$  could be estimated. The degree divisions are not numbered, and the arcs are placed as follows: *e. g.*, at "A," to measure shot angles:—draw a N. & S. line through "A"; describe from "A" as a centre, with metal arc radius, a pencil arc; place the metal arc on the penciled arc so that a minute reading near its middle point will correspond with the observed azimuth of the target; then, on a slip of paper secured along the edge of the metal arc, or with pen and ink on the metal surface, number the degree divisions accordingly. Do the same for station "B" and the gun, and there results an accurate and expeditiously prepared means for angle measurements.

The thick steel rule now supplied for measuring ranges is unwieldy, obstructs other measurements and is often too short. In its stead I would suggest either a very much thinner rule or a steel tape graduated as now to read hundreds of yards, according to the scale used, with subdivisions to read as low at least as 5 yards; to be not less than 4 feet in length, and capable of being pivoted to a needle, not a plug, through its centre at the gun. A sliding deviation scale seems cumbersome and unnecessary. As



deviations are distances measured perpendicularly to the line of fire at the target, draw this perpendicular once for all; dot its crossing by the silk thread used to give the gun azimuth of the shot, and apply a pair of dividers. Any differences due to movement of the target can be as readily determined this way as by any other known to the writer and at least as rapidly and accurately.

The lateral deviation would be more rationally defined by a chord of the arc described with gun as centre and passing through the target, this chord having one extremity in the target and the other at the intersection of silk thread with this arc. The shot is presumed to hit the target, so far as range is concerned, when it reaches this arc; so the measurement of the lateral deviation is the direct distance from target to intersection. Or, from another point of view, a lateral deviation necessitating correction in the next pointing of the gun, if this is given in azimuth to the gunner and there is an azimuth scale attached to the gun platform, the additional scale on the chart heretofore described enables this correction to be made immediately; but if lineal measurement of lateral deviation is demanded, and it is required for the record, then the prescribed way of measuring it needs to be changed; for it is apparent that if measured perpendicularly to the target line of fire, it is too great, and perpendicularly to the shot line of fire, too little: to be accurate, it should be measured by the chord above described.

## THE FIELD OUTFIT OF AN INFANTRYMAN.

BY LIEUT. JAMES RONAYNE, 19TH U. S. INFANTRY.

**A**MONG the necessities of every-day life man, in general, finds food and clothing ; and the day has long since passed when he depended for success in strife on Nature's weapons alone. The soldier, the professional and most successful peacemaker, finds food and clothing just as necessary as the ordinary man and, strange as it may appear, his success as a peacemaker depends in no small degree upon his capability to use to the best advantage instruments of strife of the most destructive nature.

In the earliest stages of civilization the army and the tribe or nation were identical : every man was a warrior and the women and children accompanied the expeditions to prepare and carry food and do such other work as they were fitted for. As civilization advanced the women, children and old men remained at home to watch the herds and till the fields while the young men grouped themselves under their chiefs for war. But as population and industry increased a division of labor became necessary, and in the earlier stages of our civilization, and as a result of its imperfectness, the division of fighting men was the most important. Egypt, possessing the oldest recorded civilization, is the first country which we find providing for an army. By its earliest laws the revenues of the state were divided into three equal parts, one of which went to the king, one to the priests and one to the warriors. Sesostris, the great military organizer of that country, effected his conquest of the then known world, according to the historians, by an army composed of 600,000 infantry, 24,000 cavalry and 27,000 war-chariots. The armies of the Assyrians and Babylonians, the successive conquerors of Egypt and the successive holders of the supremacy of the world, consisted, like that of the Egyptians, principally of infantry. With the advent of Persia as a nation, seeking and finally obtaining supremacy over the others, a marked change in the composition of armies appeared—the Persian army consisted, at first, mainly of cavalry. The race and training of these warriors had perhaps as much to

do with their success as the mobility which their army organization afforded. And we see when later the sturdy Greek, with an army consisting almost entirely of infantry, appears upon the scene what an easy work is the overthrow of the once great Persian empire. Alexander, the Macedonian, who is reckoned to-day among the great captains of the world, had an army of which about one-seventh was cavalry. The Roman legions, to which the Macedonian phalanx had to give way, had a proportion of one-tenth cavalry. The fall of Rome resulted in the rise of the feudal system throughout Europe and under this system we find the proportion of cavalry still less. The great preponderance in the matter of equipment given this arm during this period suffered a blow from which it has never since recovered when the Swiss infantry, in the three successive battles of Granson, Morat and Nancy, near the close of the 15th century, defeated the Burgundian chivalry.

When troops begin to fight behind defenses, whether intrenched camps or walled cities, the importance of artillery as a means of breaking down these obstacles and preparing for the advance of infantry appeared; and in the Old Testament we find mention of "engines invented by cunning men to shoot arrows and great stones." The Romans used the *catapulta balista* and battering ram, but until gunpowder became of general application in the art of war we do not find any trace of an artillery organization. Edward III. in 1344 formed an artillery train and an ordnance establishment numbering 340 men, the first of its kind of which we have any record. The guns were very crude and used chiefly in sieges. Some progress in their construction was made during the 15th century, and Charles VIII. of France used them successfully in his Italian campaigns toward the end of that century. Chesney, speaking about the defeat of the Swiss in 1515, says: "The French artillery played a new and distinguished part, not only by protecting the centre of the army from the charges of the Swiss phalanxes and causing them excessive loss, but also by rapidly taking up such positions from time to time during the battle as enabled the guns to play upon the flanks of the attacking columns." Since that time this branch has made wonderful progress in its equipment; it may be said to have out-classed the other branches; certainly it has the cavalry, which when fought as such to-day possesses in its equipment very few advantages over the Persian cavalry of centuries ago. Still the

rôle of artillery in battle has not changed : the French artillery in 1515 paved the way for the successes of the French infantry, and the most ardent artillerist of to-day will not claim that his arm can do any more.

Up to the present the imagination of any military writer has been unable to picture a period, or condition of affairs, when wars will not be waged principally by infantry. Both artillery and cavalry are powerful auxiliaries when properly employed : they are at times necessary for success, but the main reliance must be placed on infantry at all times. The field outfit, or, in other words, the working clothes of the unit which in the aggregate effects such wonderful changes in the political history of mankind is, therefore, a subject well worth consideration.

As in garrison, the infantryman in the field requires food, clothing (including shelter) and means of offense and defense.

#### MEANS OF OFFENSE AND DEFENSE.

We place the latter as first in importance. It is the necessity of the soldier. He may trust to chance occasionally, with fair prospect of success, for food, shelter and even clothing, because these are common necessities and the laws of war will uphold their confiscation to his use if such a proceeding be necessary ; but the means of offense and defense must never be left to chance. At present these include rifle, ammunition, bayonet and some form of intrenching tool. The rifle and ammunition are so closely connected as not to admit of separate discussion. Rapidity with accuracy, long range, and flatness of trajectory, and the least possible weight of rifle and cartridge consistent with these qualities form the essentials of a military small-arm and its ammunition. After a test of over fifty different rifles the United States finally adopted the Krag-Jorgensen model, with some modifications, as the arm for its infantry soldiers, and it is now issued to them as the U. S. Magazine Rifle. One season's test on the target range has convinced most of us that the desirable qualities above stated are possessed by this gun to a considerable extent ; to my mind, to such an extent that further improvements in a single-loader gun cannot easily be made. I have intentionally overlooked the imperfections of the sight, because they are so evident that I expect to see a new one issued very soon. We did not test, during last year's target practice, how the magazine feature of the gun would add to that quality to which end it was intended,



viz.: rapidity, or rather, rapidity with accuracy, as the former without the latter is a serious detriment resulting in the waste of valuable ammunition. In this test before the Board which recommended its adoption the magazine was loaded before the firing was commenced, and out of 20 shots, the last 5 from the magazine, 18 hits were made on a target  $6' \times 2'$  at a distance of 100 feet. I have been unable to find the correct time required to do this but it is, if I remember aright, something near one minute. Remembering the use of the military rifle and the conditions which generally prevail when the time comes for this use I cannot help being opposed to a machine which admits of being used in more than one way to the same end. Fire discipline is the key-note of success in battles, but because of the imperfections of human nature it cannot be maintained beyond a certain limit. The time will come, in every well-contested conflict, when along your fighting line the animal will predominate over the reasoning man, and then animal instincts will alone account for results. Now, at this stage with two equal opposing lines, possessing in about equal proportion the animal qualities of courage and fear, victory is the prize to be snatched by the better trained, by that animal whose mechanical movements, acquired by habit, inflict the greater injury upon the other. Let us see how this works with our present arm and drill. If a proper fire discipline has been maintained by the offensive during the advance we find the soldier at the end of the controlled fire with five cartridges in his magazine, say, at about 300 yards from the defensive (and excellent indeed must be the fire discipline which will bring him so close). The conditions of battle have now caused the greatest excitement. He begins firing from his magazine, and in his ardor and excitement, with his comrades falling around him and with the din of battle in his ears he works the bolt back and forth and pulls the trigger as fast as he possibly can. The magazine is soon empty but still the bolt is worked and the trigger pulled. If he realizes the futility of his work, which he may do, after the firing-pin has struck into an empty chamber perhaps a dozen times, he is compelled to resort to his belt for a single cartridge and change entirely his mode of fire. The change is to a slower method and we have, instead of the increasing ardor and energy necessary for successful attacks as the distance from the objective decreases, a culminating point long before the moment of actual assault. The rapidity of fire exceeding that possessed by a single-loader of to-

day's pattern becomes desirable only after uncontrolled fire begins. If a magazine contains cartridges enough to carry the soldier from this time to the moment of the bayonet charge a change in the manner of fire is advantageous and consequently advisable, but never in a weapon whose magazine capacity is as limited as ours.

Most military writers state that a soldier in battle should have between 200 and 300 rounds of ammunition. A scarcity of ammunition in the fight means disaster, but it seems to me they have allowed a figure of safety of at least 2. "Volleys may be fired at 1200 yards" say our Infantry Drill Regulations—they may be fired at 2 miles for that matter—but for what purpose in either case, I do not understand, except to waste ammunition and warn the enemy of your approach and intended attack. The object of infantry troops should be to get as near as possible to the enemy before they begin to fight. To prepare for their advance we use artillery and in their advance we continue this kind of fire as long as possible to shelter them, supplementing it with that of the skirmish, or extended order line. This, however, is only a part of the preparatory stage and the less ammunition expended the better. I claim that unless an attacking line can approach to within 600 or 700 yards of the enemy's position without expending more than 10 cartridges per man, the proper preparation has not been made and men and ammunition are needlessly lost. If the fight occurred in the middle of a prairie and the enemy was foolish enough to forego intrenching, the drill book suggestion may be used to advantage, but such a supposition is not tenable. With a proper system of supply on the battle-field it seems to me that the present belt with a capacity of 100 rounds is sufficient. Closing the loops at the bottom would perhaps add to the value of the belt by making the cartridges more accessible. The haversack could be used to carry a few original boxes if, at times, 100 rounds were not thought to be enough. Opportunities for the transfer of the contents of these boxes to the belt would occur long before the critical moment arrived. The haversack is, of course, issued for another purpose, but the soldier if detached with three days' rations therein will not meet an emergency demanding more than 100 rounds until some of his hard tack is disposed of; the extra ammunition in this case can be, meanwhile, carried in his blanket roll.

The wonderful progress in the range and precision of small-arms has caused the bayonet to take a secondary place in the armament of an infantryman. Still, it is not obsolete; it has its uses, and because they tend more in the direction of moral than practical effect, we must not decry them, remembering that victory does not depend so much upon the number of dead in the enemy's ranks as it does upon the effect of their deaths upon the living. The probabilities are that our future wars will show the bayonet charge used exclusively for moral effect—to break down what little remnant of the fighting spirit a badly demoralized enemy possesses. Our present pattern of bayonet is about as clumsy as could be devised. A rod bayonet taking the place of the present useless ramrod and held in place by a lock somewhat similar to that used on the bolt of the rifle seems to me the most convenient and practicable form. The scabbard with its extra weight, its ability to destroy our cartridge belts, and interfere with their proper manipulation, would not be needed. The lock arrangement would overcome the objectionable feature of this form of bayonet experimentally used with the Springfield, the position of which depending on a spring soon became very insecure, often resulting in the loss of the bayonet.

Napoleon I. said that the intrenching tool was one of the five things with which a soldier should never part. If the condition of affairs a century ago led to this remark from such a source how much more so should it be accepted as an axiom of the present day when, compared with its condition then, artillery and rifle fire have progressed so much in accuracy, rapidity, range and penetration. Some form of intrenching tool is a vital consideration in future battles. We have observed its uses and value in the wars of the century, and seeing this and knowing the changes in arms which have occurred since the last war we can readily imagine its importance in the next. What it should be and the method of carrying it are the questions. No military writer has questioned the value of the great commander's remark that it should be carried by the soldier always. When the time comes for its use it is badly needed and delay may mean destruction. If we examine closely into the conditions of attack and defense of which battles are composed we see fire necessitating shelter on each side, but while fire forms the base or origin we can see that shelter, born of it, helps to perpetuate it. The more shelter on the defensive, the more fire required for a successful assault, and

the more shelter during the attack enjoyed by the offensive, the more the available fire. If then "fire is everything" it follows that its offspring and, in turn, parent—shelter—is not of small account. Almost all the nations of Europe have adopted some pattern of intrenching tool. The properties which they seem to think necessary in one are that it should be a digging instrument, a cutting instrument, and some think it should have a pick attachment for stony or hard ground. The Wallace spade, combining a spade, pick and grubber, is used by some regiments in the British service. It does not meet with general favor, however, but this is occasioned principally because it is not convenient to carry. Germany, Austria, Holland, France, Russia, Roumania and Greece, have all adopted what is known as the Linnemann spade, and its superiority over any other pattern appears to be firmly established by the number of countries which have adopted it. It is a steel spade, with a blade 6 inches wide by 8 inches long; a wooden handle, rounded at the top, makes the total length about 20 inches. It weighs about 2 lbs. The blade originally had one side sharpened for use as an axe and the other cut into saw teeth, but the different countries have modified these features, some retaining both, some one, and some the other. To the carelessness which is characteristic of us in army progress, and which finds us to-day years behind the times, is due, I suppose, the fact that we have not such a thing as an intrenching tool to be carried by the men. Numerous ingenious devices have been planned, tried and recommended, but excepting the hunting knife, whose use nobody seemed to know and which after trial was returned to the arsenals, condemned as useless, no issue has been made, nothing done. The opinions of nations who devote a good deal of their attention to the progression of the military art would seem to uphold a common-sense view, not born of experience, but of a consideration of the requirements of the article, in the selection of a type of intrenching tool of the Linnemann pattern. Now as to the method of carrying it. When first thinking over this matter I concluded that if something could be found to which it could be attached, and if, when so placed, it was out of the way and did not interfere with the soldier's actions all that was required was achieved. And with this in view I decided that the best way to carry it was attached to the blanket roll, blade up, by means of a couple of straps. But upon afterthought, upon looking into the conditions governing its use this



plan was given up. The generally admitted facts that occasion for its use may arise at any moment during an attack, that the passive defense requiring its use should be capable of instantaneous change to the offensive and that it should never be separated from the soldier prove conclusively the futility of a method requiring the slinging and unslinging of the blanket roll and the buckling and unbuckling of straps before and after its use. I would now recommend a leather sheath to contain the blade attached, by means of two short slings, to an adjustable sling belt passing over the right shoulder. When not required for immediate use a hook attachment on the sling belt on which a ring placed on the front top corner of the sheath may be hung would make it more convenient to carry. Objections have been frequently made to the quantity of tackle which the soldier now carries in the shape of sling belts. In my plan of outfit for an infantry soldier by substituting the blanket roll for the ordnance pack I do away with two slings, but even if the ordnance pack were retained and a scheme for carrying an intrenching tool required of me I would still suggest a sling belt. The paraphernalia carried by the soldier is divisible into two general classes—one, his weapons of offense and defense, the other, that pertaining to the wants of every-day life. The former should be so carried as to admit of immediate use and in their use he should be hampered as little as possible by the latter. The bayonet scabbard, or anything else—attachment or otherwise—which interferes with the use of our cartridge belt, which prevents its being used as a continuous belt, movable about the body so as to bring the ammunition under our fingers, is wrong; and this is why I think sling belts should be used. Now, the necessity for an intrenching tool is generally admitted: I say, let us adopt some kind and some method of carrying it, then practise its use. Besides the valuable instruction which can thus be imparted, the defects in the tool and in the mode of carrying it will be brought before us and, as a result of the ingeniousness for which we are noted, we will have, in a short time, an instrument and a system second to none.

#### CLOTHING, INCLUDING SHELTER.

The steps taken by the military authorities of all countries during the past quarter of a century toward the independence of the soldier in the field have been governed generally by two con-

siderations, viz.: 1st, what weight can the man carry and fight ; 2d, what articles are most essential whose combined weight equals the answer to the first question. Of the Continental armies Russia estimates the weight which a man should carry at about 65 lbs. ; Austria, 63 ; France, 62 ; Germany, with her new kit, 57½ ; and Italy, about 57. Our Army Regulations are painfully silent on the subject of a field kit. Department commanders generally regulate the field outfit as the emergency for its use arises. Generally, for an infantryman, the clothing consists of campaign hat, blouse, trousers, blue shirt, undershirt, pair of drawers, pair of stockings and pair of shoes, worn on the person, and overcoat, shelter half, one or two blankets, blue shirt, change of underclothing and pair of shoes, carried in some form of knapsack. Now in determining the weight which our soldiers can carry and fight we have a phase of the question not encountered by European armies—our small standing army is to be the nucleus of an army of millions in case of war. We may train it to carry 60 or 70 lbs. without much discomfort, but what about the millions who have had no such training. We want uniformity in equipment and manœuvring and we are to be their example in these matters. It may be said that a month or two of campaigning would give them all the training they would need in the matter of carrying weighty equipments. The fact that in the future great wars may be completed and important political divisions blotted off the map of the world in this period should not be forgotten—the training may be effected too late for any use. The question then for us to decide is what can the ordinary man, physically sound but not specially trained, carry without overexerting himself and, having decided this, what is absolutely necessary for his health and comfort in the field, fill in the differences in weight with ammunition. The great variation in climate incident to the vast territory which is ours, enters very materially into this discussion, and, it seems to me, makes it very desirable that we should have, even in garrison, a light and heavy equipment—the clothing, of course, to be the only part affected. Let the soldier wear the articles above enumerated as being usually worn, but make the textile articles of wool for the heavy and, with the exception of blouse and trousers, of cotton for the light equipment. A change of underclothing, a shelter half, an overcoat, one blanket for the light and two for the heavy are all that should be carried by him. Making a blue shirt and a pair of

shoes part of the contents of a soldier's pack borders on the ridiculous. If the man could carry food, clothing and ammunition in sufficient quantities to last him for two or three months the shoes and blue shirt should be carried and the question of the supply of an army in the field would become a minor one; but, knowing the absurdity of such a supposition and the necessity for a wagon train for the different tactical units, the question should be what is the greatest length of time for which a man can carry a complete equipment—food, clothing and ammunition. If we decide on two or three days give him nothing but what is liable to be used during this time. The ordnance knapsack meets with general disapproval as a means of carrying the extra clothing. It gives so much extra weight, is clumsy and so slung as to fatigue the man unnecessarily, considering the actual weight carried.

The experience of our late war shows us that packs of all kinds were generally discarded in the field, and what is known as the blanket roll generally substituted. And I am not, by any means, the only one who sees in it to-day, points of superiority when compared with the most recent type of knapsack. As the shelter tent forms, usually, the outer covering of the roll it may be discussed here. The old pattern of tent was too short, and being open at both ends its advantages of shelter were small; the material also was too light, and if we discarded the knapsack the tent poles required could not be conveniently carried. To remedy these defects I propose a tent 7 feet long, of heavier canvas and with ends, which may be of the same weight canvas as that in the present tent. Use the rifle as a tent pole; the front sight stud on which the tent rests is 4 feet high, and if we take a width of 5 feet of canvas and allow an overlap at ridge of 3 or 4 inches we get a tent 7 feet by 5 feet, by 4 feet high. Button the ridge and end openings, using some variety of patent metal button which is not sewed on the canvas, and strengthen button holes and buttons by an additional thickness of canvas. This would make a very desirable and serviceable tent, whose advantages over the old style are apparent at a glance. The use of the rifle as a tent pole may be considered a disadvantage by some, but do we use the rifle when we are asleep or at rest, and in either case can we find a place of storing it where it will be easier to reach in case of sudden alarm, or more effectively protected (a small flap of canvas attached, near the ridge, to the end piece and through which the

guy rope passes can be buttoned over the muzzle in inclement weather). The tent can be pitched like the one now in use, each man carrying three tent pins for that purpose. These are placed when tents are struck in a pocket provided for them in the upper corner of one end piece. In the lower portion of the same end piece are other pockets in which are stored an oil-can, towel, soap, razor, strop, comb, small mirror, needles and thread and a box of patent buttons—all very desirable, and some necessary in the field. Here also is a pocket for extra ammunition. The other end piece has at its outer corner a leather strap about 2 feet long and one inch wide, and opposite this, when the tent is laid on the ground, and about a foot from it, a buckle to fit the strap. To roll it, the tent is laid flat on the ground, inside uppermost, the pins placed in the pocket for them, heads first, the extra clothing and blankets are folded to conform with the width of canvas, the pocket end turned in and then the entire bundle rolled up and secured by the strap and buckle on the other end piece. With two end pieces, the canvas is of hexagonal shape and the strap secures the roll near its centre. A loose belt between 2 and 3 feet long binds the ends of the roll at the proper distance, determined by the size of the man, and the blanket roll is ready for slinging.

#### FOOD.

A few words on the method and materials employed in carrying and preparing food in the field and I am done. The haversack and canteen have both stood the test of service satisfactorily. The latter may be made of aluminum and so might the meat-can, knife, fork and spoon ; a collapsible aluminum cup might well be substituted for the one now in use. With these changes this part of our equipment would be all that could be desired. A field ration, small in compass and of few component parts, but containing all the nourishment required by a soldier in the field is a great *desideratum*. The clothing which he must carry for a day will do for a month at least, and as the difference between its weight and the total which he is able to carry without destroying his marching or fighting qualities, is the joint allowance of his food and ammunition, the desirability of a compact ration of small weight is very evident.



# Reprints and Translations.

## GERMAN ARTILLERY AND PIONEERS.

(From "*Die Heere und Flotten der Gegenwart.*"\*)

Translated by CAPTAIN T. A. BINGHAM, U. S. ENGINEERS.

### C. THE FIELD ARTILLERY.—I. *Armament.*

THE war of 1870-71 conclusively established the superiority of the breech-loader over the muzzle-loader and all the powers made haste to begin the necessary changes. In order not to be surpassed, Germany at once adopted the improved field-gun; taking the calibre 9 cm. for the field batteries (driving) and 8 cm. for the horse batteries.

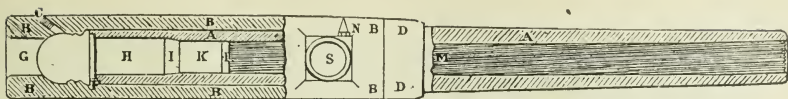
The initial velocity was greater than in 1870-71, the trajectory flatter, and accuracy and effectiveness greater. These advantages were obtained by improved construction of the gun and the use of coarse-grained powder. New double walled shells gave a greater number of bursting pieces. The introduction of ring shells increased the certainty of bursting and copper rifling rings gave greater accuracy of fire. Finally by a marked improvement in the manufacture of shrapnel, these projectiles were made suitable to be again adopted and by further gradual improvements became at last the principal projectile of field artillery.

After the experience of the Russians at Plevna, however, the question arose as to whether the field artillery with their shrapnel were in a position effectively to reach troops behind cover or to penetrate light covers. This led to the introduction of "torpedo" (high explosive) shells, which did not, however, altogether fulfill the purpose intended. Hence it became necessary either to introduce light mortars into the armament of field artillery or to take measures for getting such cannon, promptly and early, from the siege artillery armament. The latter method was adopted by Germany.

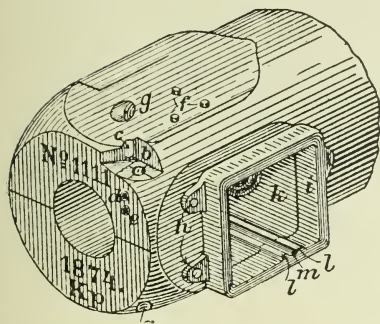
In 1886 the shrapnel was provided with a double fuse. If used as a time fuse, the projectile is burst in the air a short distance in front of the target; if used as a percussion fuse, the projectile bursts on striking and hence ordinary shell can be dispensed with for getting range.

The gradual advances which were made everywhere in the construction of all kinds of firearms brought many necessary improvements to light and led to various changes from which resulted the gun of 73/88 and later that of 73/91 and the arming of all field artillery, driving as well as horse, with a gun of 8.8 cm.

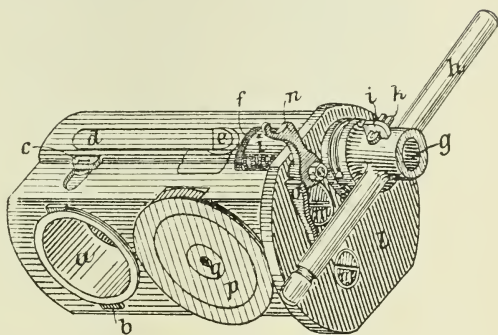
\* See review of this work in January number, 1897.



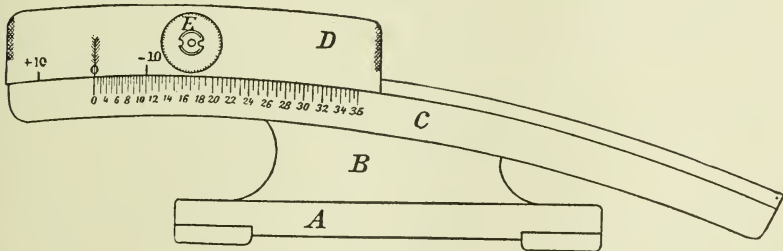
FIELD GUN C/73.



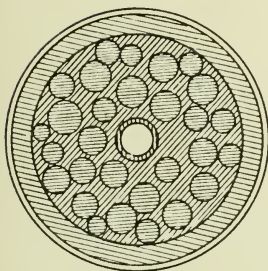
BREECH OF HEAVY FIELD-GUN C/73.



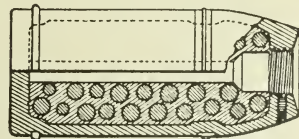
BREECH BLOCK.



AIMING ARC.

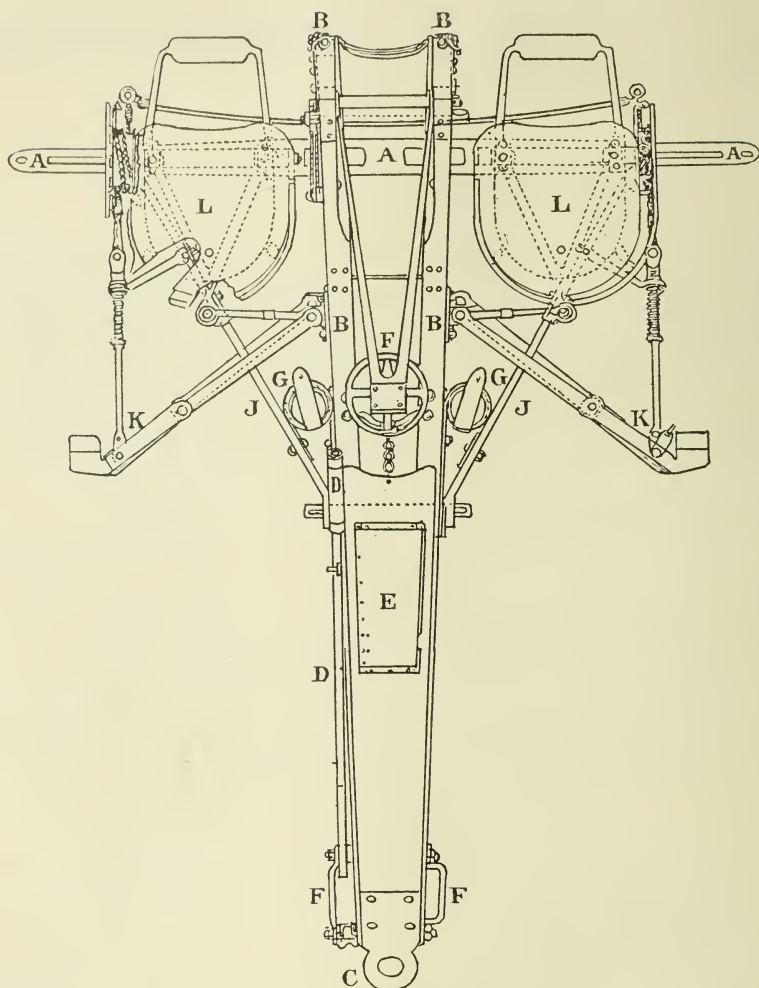


CROSS-SECTION OF SHRAPNEL.



LONGITUDINAL SECTION.

The gun tube is made of the most improved cast steel, containing a certain amount of nickel. Of all the new field-gun materials this has proved itself the most suitable for field artillery in our experience [the German]. It is a jacketed tube, that is, its rear end, especially over the powder chamber, is covered with rings in order to enable it to withstand the necessary enormous powder pressure.



FIELD CARRIAGE.

The vent passes diagonally through the breech mechanism which is of the wedge form. In order to close the joint between the breech closing block and the gun tube, packing is used which consists of rings surrounding the base of the powder chamber and so constructed as to add strength to the breech mechanism.

Sighting is accomplished by means of a fixed front sight and a removable rear sight. For firing against an invisible target or from a hidden position, a special device is used for sighting, called an aiming arc. The rifled part of the gun tube is cylindrical, while its rear part is enlarged into a powder chamber.

The carriage is made of steel plates, the two sides of the main member



FIELD-GUN UNLIMBERED.

of which (the trail) converge somewhat towards the rear. The elevating device is fastened on the trail. There are two seats on the axle for two of the gun crew, one on each side of the gun. In horse batteries these seats are not provided as all the cannoneers are mounted on horses.

The propelling charge is nitrate powder in the form of flakes, giving very little smoke. The bursting charge of shrapnel is black powder; of "torpedo" shells is picric powder, a very high explosive.

The projectiles of the field artillery consist, at present, of:

1. Middle chamber shrapnel 81 (field shrapnel). The bursting charge runs through the middle of the projectile, surrounded by the bullets with which the projectile is filled. It delivers 300 bullets and burst pieces. It has the double fuse.

2. "Torpedo" shell, likewise with double fuse.

3. Case shot.

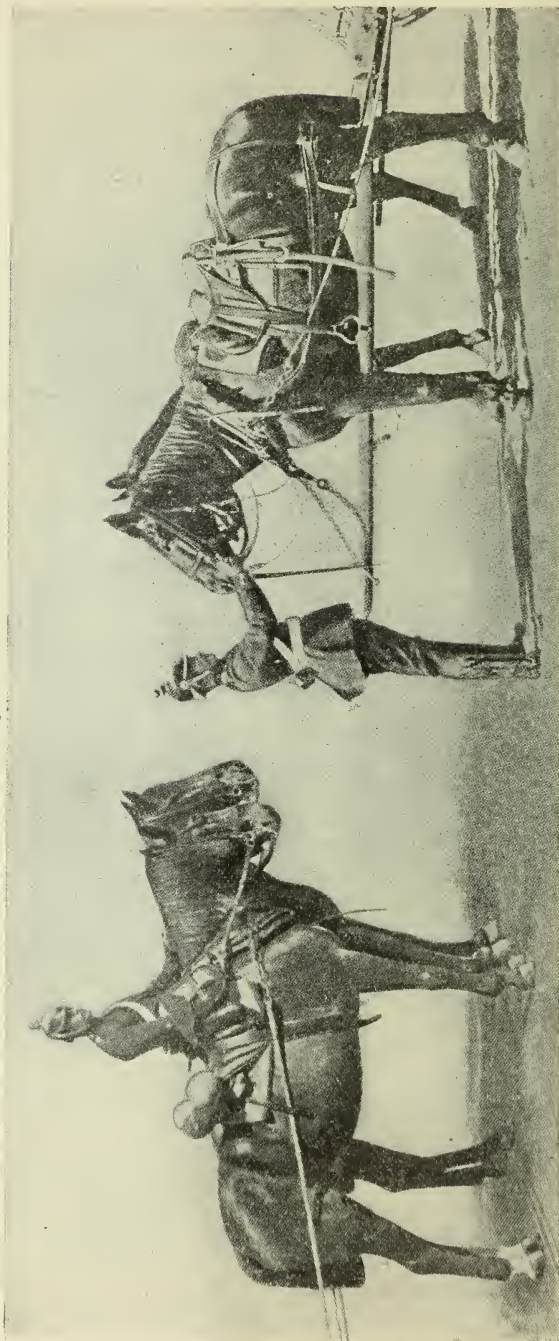
When the time fuse is used, the bullets and burst pieces of shrapnel scatter in cone shape downwards and especially to the front. An average space of 218 yards is thus covered by such fire, which is dangerous for men lying down.

When the percussion fuse is used the shrapnel acts like a shell and, as its bursting charge is black powder giving a white smoke, it is used for getting ranges.

The "torpedo" shell gives about 500 burst pieces. With a time fuse, it is used against troops behind cover, because the great force of the high explosive charge drives the pieces in *all* directions; with percussion fuse the torpedo shell is used to destroy cover of all kinds. The effectiveness of the torpedo shell with percussion fuse depends, however, very much on the kind of soil attacked and is only moderate against upward slopes or soft ground. The smoke from its explosion is very dark or black, and hence it is not suited to getting ranges.

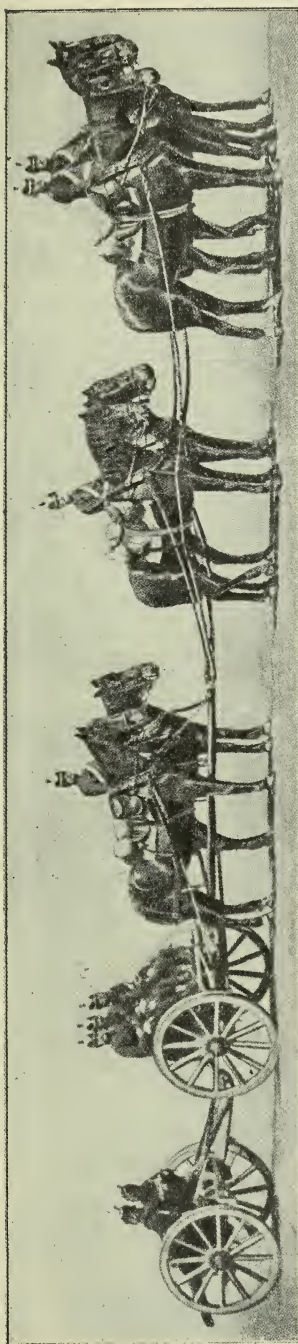
The case shot contains 67 lead bullets and is intended for short ranges. It was a makeshift in 1870.





LEADERS ON THE MARCH.

WHEEL HORSES.



FIELD-GUN ON THE MARCH.

The greatest range of shrapnel, time fuse, is 4500 metres = 4905 yds.

The greatest range of torpedo shell, time fuse, is 4500 metres = 4509 yds.

The greatest range of projectile, percussion fuse = 6500 metres = 7085 yds.

Case shot is used only at 325 yds. and shorter ranges.

The firing table of field gun C/73/88 gives for shrapnel C/91 initial velocity of 442 m., and of field-gun C/73/91 for torpedo shell initial velocity of 1450 feet.

The error of departure is  $\frac{6}{16}$  of one degree.

This means that the projectile, having a velocity measured a short distance in front of the muzzle, flies 1450 feet per second. But while the projectile leaves the bore of the gun in about  $\frac{7}{1000}$  of a second, the powerful recoil during that time so changes the elevation of the gun tube that the elevation of the projectile on leaving the bore is about  $\frac{6}{16}$  of one degree higher than it was when the gun was originally aimed with the projectile at the base of the gun.

The movable sight has a side motion to permit of correction for drift of the projectile to the right in consequence of its rapid rotation, due to the rifling, about its longitudinal axis. This drift amounts to

4 metres for a range of	2000 metres.
28 " " " "	4000 "
156 " " " "	6500 "

The dimensions given in the following tables of accuracy under the head of 50 per cent. hits are based on the most favorable location for the middle hit—viz., the middle of the target. This presupposes that the target is so large that there are no misses in side shots falling within the limits of the target in height. For example, at 2000 metres, 50 per cent. of hits with percussion fuses will be attained if the target has a height of 2.5 metres (or a length of 23 metres) with the middle hit in the middle of the target and with

a breadth of target so great that side misses do not occur. This required breadth is obtained by making it equal to  $1.8 \text{ metres} \times 4$ .

With a target 2.5 m. high (or 23 m. long, in the direction of fire) and 1.8 m. wide, 25 per cent. of hits are obtained if the centre hit be in the centre of target. Suppose a wall 2.5 m. metres high is being fired at from a range of 2000 metres and that it has sufficient breadth; then, if half the shots are short or over, that is, below the base or over the top, we can reckon on from 50 per cent. of hits down to about 41 per cent. The probability of hits outside of the 50 per cent. area of target is very much less than inside.

EXTRACT FROM FIRING TABLE.

Range.	Elevation.	Allowance for deviation.	Angle of fall.	Time of flight.	$\frac{1}{16}$ of one degree in elevation raises the hit.	$\frac{1}{16}$ of one degree alters the range.	Bursting height for 50 m. of bursting range.	Final velocity.	Dangerous space for a target 1.7 m. high.
m.	Deg.	Scale divs.	Deg.	Sec.	m.	m.	m.	m.	m.
1500	$21\frac{1}{8}$	31	$41\frac{3}{8}$	4.4	1.6	23	3.4	290	23
2000	$41\frac{1}{8}$	32	$61\frac{3}{8}$	6.2	2.2	20	5.3	268	16
2500	$51\frac{1}{8}$	33	$81\frac{1}{8}$	8.2	2.7	18	7.7	249	11
3500	$101\frac{1}{8}$	35	$151\frac{3}{8}$	12.6	3.7	14	13.7	220	7
4500	$151\frac{1}{8}$	39	$241\frac{1}{8}$	18.1	4.6	10	22.9	198	4
6500	$411\frac{1}{8}$	54	$591\frac{1}{8}$	39.9	...	..	....	207	..

TABLE OF ACCURACY.

Range.	Percussion Fuse.			Time Fuse.	
	50% of hits require a target.			50% of hits lie in a space.	
	High. m.	Broad. m.	Long. m.	High m.	Long. m.
m.					
1400	1.4	1.2	21	2.0	25
2000	2.5	1.8	23	3.4	28
2400	3.6	2.4	24	4.6	30
3400	...	4.1	29	9.1	35
4500	...	6.6	35	19.3	41
6500	...	13.2	60	....	..

For a target, in the open and easy of observation, a complete war equipped battery, at a range from 3000 m. to 1000 m., has a great advantage over advancing infantry. It is only at ranges below 1000 m. that the fire of bodies of riflemen becomes equal to that from a battery.

In the fight between field batteries, effectiveness beyond 3000 m. is but small. At 2500 m. the battery whose range is got first will suffer the more.

Gun crews in driving (field) batteries carry a short bayonet on the belt.

Officers, non-commissioned officers, gun crews and drivers in the horse artillery carry sabres.

Excepting drivers, all artillerymen carry the revolver 83.

The following intrenching tools are carried by each driving or horse battery :

38 large spades ; 31 mattock picks ; 11 axes ; 23 hatchets.

2. *Equipment*.—Helmet, knapsack, belt and clasp, sabre belt for drivers without cartridge pouches ; rest of equipment same as in the infantry.

The helmet is, except in Bavarian troops, surmounted by a ball.

3. *Clothing*.—Blue coat with black collar and bindings ; red shoulder pieces. Only the Saxon artillerists wear green coats. Trousers and all other clothing the same as in the infantry, except that the Bavarian artillery have broad red stripes on the trousers.

In the Prussian Guard Corps there are pipings on the collar and, for reviews, black plumes on the helmets.

#### D. THE FOOT ARTILLERY.

1. *Armament*.—The German siege artillery showed itself invariably superior in its struggle with the French and its effectiveness against the, for the most part, out-of-date works of the French was very marked. It is true that rifled mortars were used in but small number but their destructive capabilities were proved to be most effective.

From the experience thus gained, it was concluded to develop further the system of mortar fire, to increase the range and accuracy of flat trajectory guns and to construct them in the most enduring manner possible, in order to avoid the frequent accidents which occurred in their use during 1870-71.

All the inventions made during the twenty-five years subsequent to the war were of especial value to the fortress and siege artillery because variety of targets and guns is a peculiarity of this arm of service.

Recalling the changes during that period, it may be concluded that the construction of cannon, considered by itself, has made great strides. Because the slower burning kinds of powder have permitted powder chamber to be enlarged and powder charge to be increased ; and consequently initial velocity and range to be increased. To have increased the charge of quick burning powders would have increased the danger of bursting the guns.

These slow burning kinds of powder were 1, the coarse grained, 2, the prismatic and later 3, the smokeless.

Accuracy was also increased, as in the field artillery, by the adoption of copper rings for taking the rifling.

Progress in the manufacture of gun material, of improved cast-steel, of hard bronze ; improvements in breech mechanisms, for example, round wedges instead of flat ; and the interrupted screw instead of either, especially for chambered mortars—all these were important helps in gun construction, as regards range as well as endurance. A range of 10 kilometres is now counted on (6 miles) in fortress warfare.

Improvements in fuses have had a remarkable effect on the capabilities of shrapnel and of mortar fire. The introduction of a high explosive that could be used for bursting charges has exerted much effect.

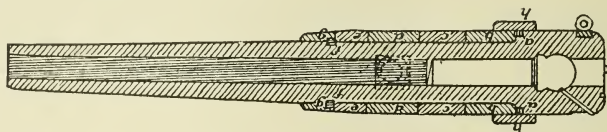
In the construction of foot artillery armament it had also to be consid-



ered that a partial function of field artillery was to be performed by it. Reference is had to the fact that upon mobilization a number of foot artillery batteries will be ordered out at once to follow directly after the active army, to be used against fortified places, especially the French frontier forts.

Another consideration of influence was that the increased use of armor in fortresses demanded increased projectile effect.

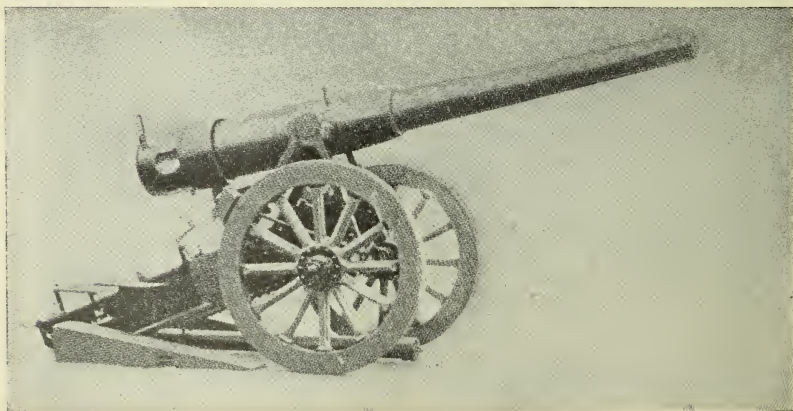
The following kinds of cannon are now adopted in the siege and fortress artillery:



THE 15 CM. (5."9) RING CANNON.

#### SIEGE GUNS.

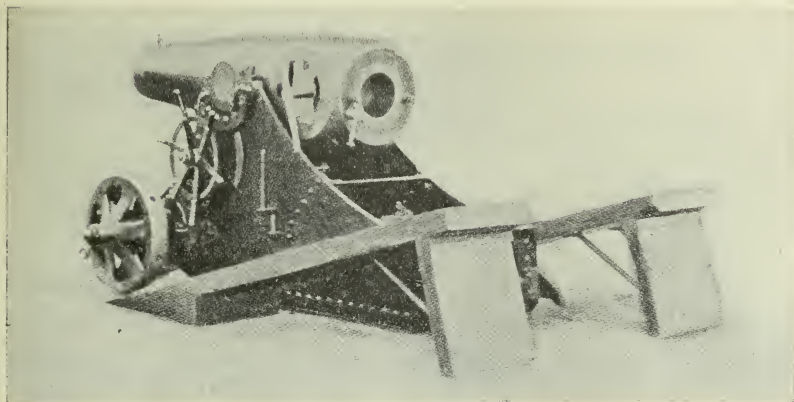
- a. Flat trajectory guns. Heavy 12 cm. (4".72) cannon.  
Long 15 cm. (5".90) cannon.
- b. High angle guns (howitzers, mortars) 15 cm. (5".90) steel howitzer.  
This is the principal weapon of the siege artillery and for the attack on fortified places.  
21 cm. (8".27) mortar with inner steel tube. This is a heavy mortar of very decisive effectiveness.



LONG 15 CM. CANNON.

#### FORTRESS GUNS.

- a. Flat trajectory guns. Heavy 12 cm. (4".72) cannon.  
Long 15 cm. (5".90) "  
Heavy 9 cm. (3".54) gun.  
The heavy field-gun.  
The light field-gun.  
The 9 cm. (3".54) steel cannon.



THE 21 CM. MORTAR.

The 15 cm. (5".90) "ring" cannon—tube reinforced by rings.

The old 12 cm. (4".72) gun.

The old 15 cm. (5".90) gun.

The 21 cm. (8".27) jacketed cannon.

Short 15 cm. (5".90) cannon.

Long 15 cm. (5".90) mortar.

The 21 cm. (8".27) cupola howitzer.

The 3.7 cm. (1".45) revolver cannon.

5.0 cm. (1".97) quick fire cannon.

5.0 cm. (1".97) cannon.

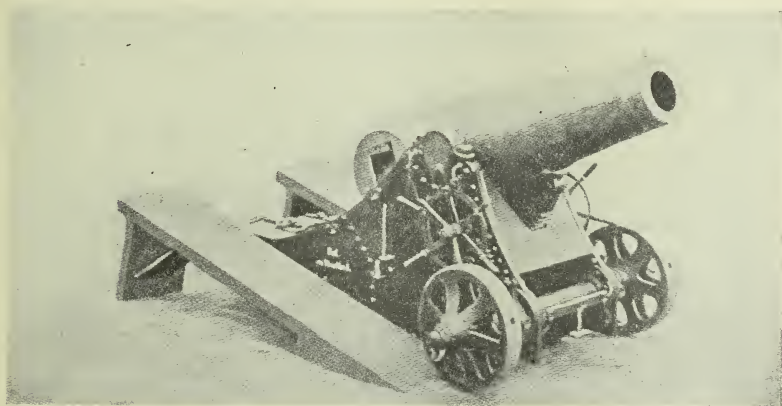
b. High angle guns.

c. Short range guns.

The short range guns are intended to repulse attacks in force and to flank the ditches.

Finally, the fortress artillery have illuminating rockets fired from stands.

Sea-coast guns are a special arm of service, whose projectiles are inten-



THE 21 CM MORTAR.

ded to penetrate side armor of ships and their protective decks. Among them are guns and mortars of 15 cm. (5".90); 21 cm. (8".27); and 28 cm. (11".0).

The following projectiles are adopted in the foot artillery :

1. Torpedo shells.
2. Long shells (projectile with the ordinary bursting charge).
3. Shrapnel.
4. Case shot.

The carriages for siege guns and, with few exception, of the fortress artillery also, are not only intended to be fired from but to be used for transportation of the piece, and have been lately improved.

The 15 cm. (5".90) steel howitzer has a low carriage capable of also easily transporting the piece.

Large wedges are, in action, placed behind the firing wheels to check recoil.

For long distance transportation, the heaviest guns are lifted up on special cannon carriages.

Siege-gun limbers are built with saddles in which the guns lie during transportation—they carry no tools nor equipments nor any ammunition. Only the 15 cm. (5".9) howitzer has a limber chest on its limber—but this piece is really only a heavy field-gun. If we were to take such guns into the field, it would be a return to that period in the 18th century, when we had discarded the parks of heavy guns which, at that time, followed an army in the field.

This shows that one cannot always regard necessary changes as absolute progress at the time; and is, also, a proof of the many-sidedness of war.

The effects of modern siege and fortress cannon are tremendous. Ordinary earth cover, such as was formerly bombproof, is now no longer sufficient. The disturbance caused by the bursting of a heavy high-angle projectile resembles the blowing up of a small mine.

#### SMALL-ARM ARMAMENT.

The foot artillery carries the 91 rifle, which is only 95 cm. (37".4) long and weighs 3.1 kg. (6.82 lbs.). It is sighted only to 1200 metres=1308 yards. It varies but slightly from the 88 rifle.

The bayonet is similar to the 71 bayonet worn by the infantry. Officers, first sergeants, etc., carry the officers' artillery sabre.

#### EQUIPMENT.

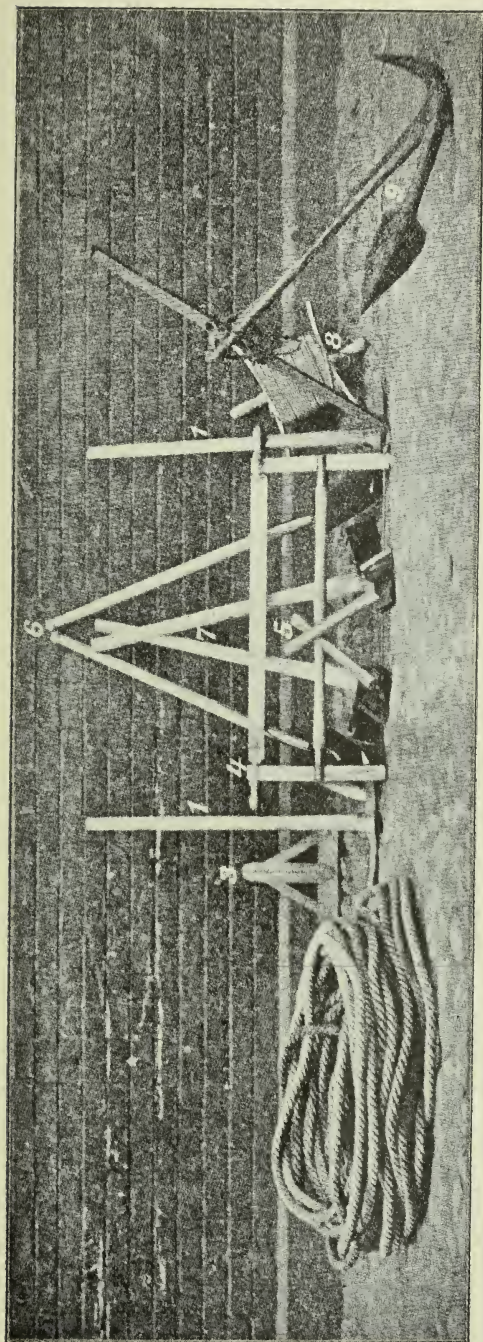
Helmet surmounted by a ball instead of a spike, knapsack, belt, coat straps, two cartridge pouches.

The foot artillery carry neither intrenching tools nor tents.

#### CLOTHING.

Blue coats; collar and its bindings, black; shoulder pieces, white. The coats are green in the Saxon foot artillery and light blue in the Bavarian. Trousers are gray, except in Bavaria where they are light blue.





PIONEER TOOLS.

## E. PIONEERS.

They are armed with the 88 rifle and a bayonet, the fascine knife. Officers, first sergeants, etc., are armed as in the infantry.

Each company carries the following intrenching tools :

- 88 large spades,
- 45 axes,
- 44 mattock picks,
- 18 hatchets.

In the intrenching and tool wagon are :

- 60 large spades,
- 20 axes,
- 30 mattock picks,
- 12 saws.

The helmet has ornaments of white metal. All leather is black. Coat is blue (Saxon, green). Collar and its bindings are black. Shoulder pieces with numbers are red. Buttons are white. Officers wear silver lace on the collar. Otherwise, equipment and clothing are the same as in the infantry.

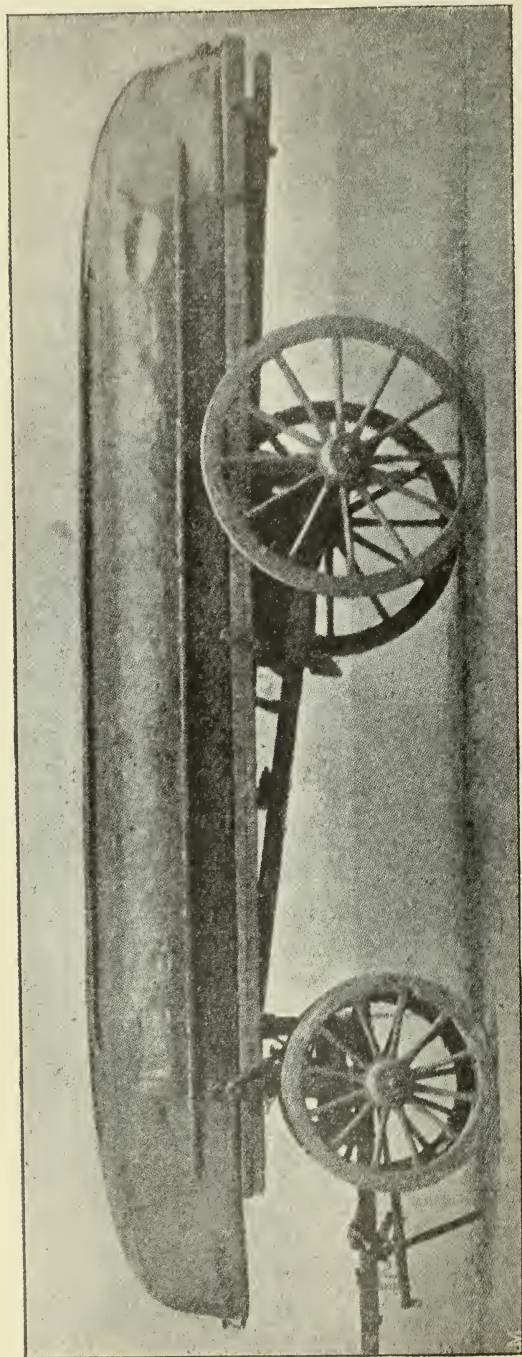
## F. RAILROAD TROOPS.

Armament, equipment and uniform same as in the Pioneers. A letter "E" is worn on the shoulder piece.

## G. THE TRAIN.

1. *Armament.*—Carbine 88; cavalry sabre; officers wear the cavalry officers' sabre of 1852 and the revolver 83; first sergeants, etc., wear the same.





LOADED PONTON WAGON.

2. *Equipment.* —

Shako, with black plume for ceremonies. Officers wear helmet, white sabre straps, bandolier, coat straps.

3. *Clothing.* —

Blue coat; light blue collar, bindings and shoulder pieces. In Saxony, light blue coat, black collar and bindings, light blue shoulder pieces.

Train soldiers who belong to the various bodies of troops in the war formation wear the uniform of such troops and also their side arms.

Letter-carriers in the war formation wear crimson collars and bindings.

IX. INTERIOR ADMINISTRATION AND GARRISON DUTY.

The first title includes:

(a) The business routine of the various headquarters ;

(b) The daily issue of orders to the troops ;

(c) Such service reports as pertain to  
1. maintenance of order and discipline ;

2. health and cleanliness ;

3. quarters, food and equipment ;

4. barrack life of the troops.

All this is techni-

cally called "interior administration." Interior administration must be so arranged as to resemble field requirements, as much as possible, in its routine and in the blanks used. The main points of clerical routine are described in the account of the functions of the general staff and of adjutants. Something remains to be said here, however, in regard to the form and routine of daily business.

One or more office rooms are supplied only for headquarters down to and including those of a battalion (infantry, cavalry and artillery). Companies, troops and batteries must utilize the first sergeant's room for the small amount of necessary clerical work.

Office hours are established by the corresponding commanding officer, and they are made longer as required by the work to be done.

Upon the arrival of the mail, the commanding officer or the adjutant acting for him puts on the "receipt stamp." The papers are then numbered and entered in a journal. Answers and other necessary papers are then prepared by the adjutant, or if necessary, by the commanding officer himself.

Registration in all offices is done under four classifications, each of which includes one or more kinds of administrative business.

At an appointed hour towards midday the commanding officer receives the reports of

1. The adjutant.
2. The general staff officer (for a division and upwards).
3. The auditor.
4. The inspector.
5. Intendance officials.
6. The military surgeon.
7. The paymaster.

After the transaction of this business and the signing by the commanding officer of necessary papers, these are made ready for transmission at once, the "sending stamp" put on, numbers affixed and entry thereof made in the journal with briefs of the contents.

"Short-hand" is much used in the German army.

After reports have been made as above, follows the issue of orders to adjutants and first sergeants. At this time is published the "parole" given out by the "commandant of the place" or by the ranking officer of the garrison. This old custom, is of course, derived from the campaign custom of former times of using a certain word by which friends could know each other at night. This word of recognition gradually crept into garrison service under the name of "parole," while, for service in the field, the Prussian army introduced another "signal and cry" which was only abolished in 1887, whether rightly or wrongly will not here be argued.

The "parole" is, as a rule, the name of some combat or a phrase like "Long live the Emperor!"

After this, the ranking adjutant dictates to the others the orders of his commanding officer. These pertain to the service routine for the next 24 hours; for the military day begins and ends at noon. These so-called

"parole orders" give all the details of service for the 24 hours especially as regards the drills to be held; they also cover:

Labor ("fatigue").	Matters of routine.
Courts-martial.	Promotions.
Garrison-duty (a special classification).	Changes of station.
Details for detached service.	Leaves of absence and furloughs.
Punishments.	Commendations or compliments.

[It will be remembered that these orders are dictated to adjutants and first sergeants who write them simultaneously, thus saving labor and insuring promptness in transmission.—*T. A. B.*]

The first sergeants then read these orders to their captains who, if not under higher orders at the time, at once take steps for carrying them out or for the necessary action by their companies. The orders are entered in the so-called "parole book" or "order book" and are transmitted to other officers of the company and to the men by sending copies or the book itself and by reading them out at the next "call" or assembly of the company.

At this time also are brought to report to the captains, the new recruits received; men going on detached service or otherwise leaving by order; men who are to have orders of punishment published to them; and men to be punished by the captain acting as "summary court" or as examining officer before they are referred to a higher court.

Every morning the men who report sick are taken to the surgeon for his action and thereafter every company, troop, etc., renders a "morning report" of its actual strength in rank and file, showing the number sick, in arrest, on detached service, on furlough.

Upon these the battalion reports are based which then go to regimental headquarters.

The companies make a "ration return" every month and upon these are based the ration returns of the battalions.

In every company a "non-commissioned officer of the day" is detailed to maintain order and discipline and to assist the first sergeant. He inspects all barrack rooms, the first thing in the morning; takes men who report at "sick call" to the surgeon and reports action on them to the first sergeant; takes men placed in arrest to the confinement room. He is responsible for the cleanliness of corridors and stairs of barracks.

In the squad rooms the room orderlies (generally the oldest soldiers) are responsible for cleanliness.

There is also a commissioned barrack "officer of the day" for each barrack, who has charge of the barrack guard and is over the non-commissioned "officers of the day" above referred to.

[NOTE.—Barracks, as mentioned, generally quarter a battalion.—*T. A. B.*]

The ranking officer in each barrack acts as "barrack president" and deals directly with the "barrack inspector," who is the representative of the garrison administration.

Commissioned and non-commissioned "officers of the day" must not leave the barracks during their tours of duty.

After the midday issue of orders the non-commissioned "officer of the



day " publishes them in the squad rooms in case no "call " or assembly of the men is to take place at once.

The word "call" as used (*appell*) means an assembly for roll-call or publication of orders [what is often designated in the U. S. Service as "formation."—*T. A. B.*]

In the evening at "taps," the non-commissioned "officer of the day" makes the rounds of the squad rooms, notes who are absent and reports to the first sergeant ["check."—*T. A. B.*] He also inspects the canteens [Post Exchanges.—*T. A. B.*] and sends out all the soldiers he finds there.

The term "interior administration" also includes policing of barracks and their yards or the parts of towns surrounding them. Further, all other "fatigue" labor done by a subdivision of troops; receipt of rations in the kitchen; preparation of meals by the cook detailed for that duty; marching to and from meals and behavior at meals; payment of troops.

Bread is issued to the men every fourth day. An officer is present at the issue, to inspect and taste it and to reject defective loaves.

The men are paid every ten days, counting from the first of the month. This formation is "pay call." The company commander is present and asks each man if his pay is correct.

Messes are by battalions and also by companies, and are inspected by an officer daily.

Although, when in the field, the routine of duty is altered by a hundred different incidents and circumstances, still, the principle of definite times for duty exerts its beneficial influence for an exact and punctual transaction of business.

#### GARRISON DUTY.

By this term is meant such duty as may be ordered for all the troops stationed at one locality by their proper commanding officer or by the ranking officer of the garrison. Only in rare cases are drills so ordered, but the duty consists of actual services rendered by the military for the benefit of garrison institutions or for the general good. The first and most important is

#### GUARD DUTY.

Guards are posted to protect government property and prisons, to maintain order and for similar purposes. Guards of honor are posted for his majesty the emperor and king and for German and foreign sovereigns.

Officers and men detailed for guard duty assemble at some designated place. It depends on local orders whether guard mounting takes place under the orders and superintendence of the commanding officer of the troops, the garrison officer of the day, or the commanding officer of the place and the "garrison major" (*Platz major*).

Garrison guards are detailed from the infantry, only exceptionally from foot artillery and pioneers.

Guard mounting takes place with drum corps or bugler and the guard is then under the orders of the commanding officer of the place, the officer of the day and guard patrols. Orders are obeyed only when from one of these sources. Guard mounting includes a passing in review and the old guard is then relieved with simple forms established by regulations. Morn-



ing and evening, the outlying guards report to the main guard station of the garrison and these reports are transmitted to garrison headquarters.

Honors to be paid by guards and sentries are laid down in garrison regulations. The regulations for guard duty are strict and form a good preparatory school for the different forms of this most important duty in time of war. Leaving a guard or post, sleeping on post, laying down the rifle—all are stringently punished.

Guards are authorized to make a formal imprisonment only by order of a court or of some high authority. They are authorized to make temporary confinements if any one be caught in delinquency or crime or deliberately violates the regulations for guards and sentries.

#### GUARDS MAY USE THEIR WEAPONS.

1. If any one actually resists arrest or attempts flight thereafter.
2. To repel assaults on guards.
3. To disperse a riot, if, after a thrice-repeated call to disperse accompanied by a bugle signal, the mob does not disperse or does not lay down any weapons it may have or working tools intended for use as weapons.

The officer of the day and the patrol officers inspect the guards by day and by night.

Uniform for guard duty is helmet, dress coat, cloth or linen trousers, knapsack with mess can, rifle and bayonet. Officers always wear the sash.

Garrison "fatigue" duty is mostly for depots, laboratories and military institutions of all kinds. The men are then, for the time being, under the orders of the department for which they are working.

Going to church is also regulated by the garrison headquarters and counts as garrison duty.

Court-martial duty by order of the garrison commandant is also garrison duty.

Quelling disturbances in a town is garrison duty. The troops are detailed by garrison headquarters but are then handled from corps headquarters.

The primary law in regard to the use of the military in Prussia is the law of March 20, 1837, regulating the use of weapons by soldiers. Other States of the empire have similar laws of their own.

Firearms will only be used when other weapons have proved powerless (Par. 7).

It is a ground principle that the military step in only upon call of the civil authorities; and that this shall be for guard duty or for quiet and order in case of pressing danger.

When, however, the military are detailed to uphold the civil authorities, not the civil but the military commander must decide whether and in what manner weapons shall be used.

#### X. DEVELOPMENT OF TACTICS, DRILL REGULATIONS AND INSTRUCTION— INFANTRY, CAVALRY AND ARTILLERY. HISTORICAL.

At the commencement of the 18th century the superiority of firearms for footmen, over the pike, had been established. The result was the

"linear" system of tactics which maintained itself in the Prussian army until the end of that century and even to the beginning of the 19th. In that system the greatest stress was laid upon the greatest possible speed in the use of the firearm, upon fire in masses, the salvoes and upon the movements of subdivisions in close order.

The training of the men, drilling, that is, developed in many armies into much over-refinement. It was only in Prussia, under kings Frederick William I. and Frederick II. (the Great) that drill regulations were simplified and the Prussian army quickly surpassed all others in accuracy of evolution and rapidity of fire. These results were reached by a very strict discipline and by a course of instruction which demanded the most careful instruction of the soldier in details, as a foundation for his later training.

Frederick the Great demanded of his infantry an unhalting advance accompanied by firing and a final dash with the bayonet. His custom was to attack the flank of the enemy and by using the oblique order of battle to have one wing of infantry as reserve; and he succeeded in many cases in putting to flight the slower moving, unwieldy masses of his enemies. He required from his cavalry, also, the most exact evolutions in large masses and reckless attack at highest speed.

The artillery, which had been materially increased toward the end of the Seven Years' War, was much strengthened by Frederick's creation of horse artillery which acted most favorably for its development.

Fighting by infantry in scattered order had as good as disappeared from all well regulated armies, but was revived in the American War of Revolution and in the French Revolutionary wars. The column, which, in the 18th century, was only a manœuvre formation, was also adopted by the French at this time as a battle formation.

The "linear" system, which after Frederick's death became ossified and utterly ruined by stupid pedants, failed in 1806 for ever and was replaced in Prussia by a method of fighting which combined an attack in close column, to a certain extent, with an open order formation.

The newly formed "light troops," such as fusileers, chasseurs, etc., made special use of the open order. The new principles were very suitably set forth in the Infantry Drill Regulations of 1812.

Even before 1806 the principle of using cavalry in large masses had been abandoned and in 1813 we find it, for the most part, divided up among mixed brigades which, at that time, were the first unit comprising different arms of service, corresponding to the mixed divisions of the present day.

The same happened to the artillery. The use of both these arms in large masses under one leader, was not nearly so common during the war for freedom as it was in Napoleon's armies. Rigid drill, with the greatest exactness of evolution, was retained from the old army, not only as a means to victory but for attaining a high degree of discipline.

A ruinous pedantry prevailed during the long peace from 1815 to 1848. The Infantry Drill Regulations of 1847 only added to those of 1812 a greater number of unpractical, over refined forms; but it did the one fortunate thing of introducing the "company column" and thereby giving

the infantry a formation which embodied the open order method most satisfactorily and at the same time opened a wide field of independent activity to the Prussian infantry officer. All this did not, however, come at once.

"Middle column" battalion line and battalion salvoes still remained, for long, as the principal fighting formation; and the company column and its use often led later directly across the path of tactical arbitrariness and obstinacy and greater scattering of the troops. However, gradually and after many struggles, the correct use of this formation forced its way through.

By 1849, the experiences of the minor campaign of 1848-49 had cut away many dead branches, but a fresh breeze blew over the army when the government of the Prince Regent came into power.

At this period armies everywhere had arrived at the point of striving for or of introducing an armament of the mass of the infantry with rifled muskets. Prussia had adopted the needle-gun which had been declared by most foreign officers as an impracticable weapon. In 1865, that is, after the Danish campaign, a high Prussian officer asked one of the best army commanders in a foreign army what he thought of the needle-gun.

"Useless for war," was the answer.

"But," replied the Prussian, "has your Excellency never heard of the action of Lundy in Jutland?"

"Never a syllable!"

The "Instructions for Field Service, 1861," showed the proper method of using this musket. But to the initiative of the army, of the officers themselves, must the credit be given for having, by unremitting study of the war experience of foreign armies (war in the Orient 1854-55, Italian war of 1859), created such an activity in training as to produce the Prussian infantry of the early sixties, which William I. had for use in his wars. Company commanders were well posted in the use of the small columns, which gave a certain amount of independent action, and the soldiers were well instructed in utilizing inequalities of *terrain* and in the movements of a line of skirmishers. This line was already, by drill regulations, divided into groups (instructions by the Prince of Prussia, 1854).

Special mention is deserved of the system of firing regulations as introduced in the Prussian infantry upon the adoption of the needle-gun. It was based on a thorough elementary preparation in aiming and firing; and secondly, on the maxim that no soldier should be advanced until he had made a certain number of hits at a certain distance. The men were divided into firing classes and could be promoted to a higher class only by making a good record. At that time no army could boast of anything like as good an average instruction in firing as the Prussian army. The result of the campaigns of 1864 and 1866 proved how high a grade the Prussian infantry had reached.

During the long years of peace the technical instruction of cavalry was improved by careful riding instruction, but for a long time attention to rough and cross country riding was neglected and the horses were spared too much. Manœuvres in large masses, too, were held only occa-

sionally. But a reaction set in during the fifties and sixties. Prince Frederick Charles and others pointed out the proper course for this arm; and yet, in 1866, the lack of a proper comprehension of the use of cavalry in large masses and of practice in reconnaissance duty was many times evident.

As early as the forties the artillery evinced a tendency toward lighter and more mobile equipment, and a new armament was adopted at that time. The introduction of rifled breech-loaders in 1866 failed in the results expected because the artillery was, as a rule, not properly handled. It was kept back too long and was not put in in masses.

The experiences of the 1866 campaign produced a complete revolution in tactical views. The cavalry and artillery made good use of this and the regulations which were issued enabled these arms to accomplish the tasks which fell to them in the Franco-Prussian War; although, it is true, there were times when the cavalry did not accomplish what it should have in reconnaissance duty. For example, after Weissenburg and Wörth, and on August 17 after Vionville.

The artillery was, for the most part, brought into action in masses in the true Napoleonic spirit and took a large share in deciding the tactical conduct of the war.

In 1866 the infantry method of fighting succeeded finely against the Austrians, who were armed with muzzle-loaders and had a defective tactics. But there were voices who claimed with justice that the future, when all armies should have breech-loaders, would demand a different training, and especially a better instruction of infantry in fire by masses, on the firing line; and a stronger control of fire, or fire discipline, in group firing.

For these purposes the useless formations of the 1847 regulations had to be done away and the "company column" and skirmish group developed as suitable battle formations.\* But the authorities could not definitely decide to do this, and so the infantry entered on its new struggle with, to a certain extent, a double method of fighting; that of the drill ground with its antiquated formations, used only there, and that of the manœuvre field. These antiquated formations and lack of practice in fighting by large groups, caused the Germans, opposed as they were to the superior rifle of the French, to purchase victory, at certain places in the beginning of the war, by very severe sacrifices. It must not be forgotten, however, that attack always is at the cost of great sacrifice. The course of the campaign finally developed the correct method of fighting.

Germany's wonderful success and the important experiences of the war now produced an activity in tactical and technical respects, in all armies, such as never before existed for minuteness and scope. A rich military literature sprang up everywhere, based on war experience. Opinions and theories crossed each other in all directions.

Considering first the infantry arm, we see that, as regards the proper methods, it was a very long time before we got out of the woods into the open, and that it was not found possible to throw off antiquity completely.

\* See "Taktische Rückblicke," 1868, by Capt. May, who fell at Amiens. Also, "Die Entwicklung der Taktik von 1793 bis zur Gegenwart," von Boguslawski.



This was, however, to some extent compensated for by excellent advice in the execution of field service given to the higher officers and by important progress in the establishment of large battle-fire drills in the field. The firing school opened the gates of really scientific shooting (1878) but got beyond its proper limits because it preached battle theories which gave too much prominence to long range firing in masses (Major Mieg's system).

It would carry us too far here to describe in detail the tendencies in this direction and that. Let it suffice to say that the infantry, in spite of all difficulties, has still followed in general the correct path, and by the eighties had worked out an education suited to the weapons of to-day and the present method of fighting. This result is, in great measure, due to an intellectual impetus from the army itself which has exerted a powerful influence upon the methods of training and handling troops. This intellectual movement found expression during the seventies in a series of publications which can be truly said to have been of influence on all armies. In the sphere of general tactics and the handling of troops may be specified "*Studien über Truppenführung*," by von Verdy du Vernois and the publications of Scherff and Boguslawski. [NOTE.—Von Verdy's book should be called "*Studies in the Handling of Troops*," not as given by the English translator.—*T. A. B.*]

Meanwhile the publication of a new Drill Regulations could no longer be delayed unless we were willing to be surpassed by all other armies. So after a new Manual for Field Service had been issued in 1887 the long expected Drill Regulations were published in 1888. Notice must be taken of the thorough instruction, during this time, of infantry in the rapid construction of field fortifications, especially in throwing up rifle-pits with the small spade.

Since 1870-71 the cavalry has also experienced an important period of internal development. The Drill Regulations of 1876 had simplified the foundation formations and, in connection with a carefully graded instruction, required a good schooling in jumping obstacles, bold cross country riding and in covering long distances at a gallop. Finally, definite instructions were given for the formation and evolutions of large bodies such as cavalry divisions of six regiments. Reconnaissance was most thoroughly practiced in its minor and larger details and excellent results were obtained. By the general introduction of the carbine, the fight on foot was also brought into considerable prominence.

On the other hand there was too much tendency to give the cavalry the same activity on the battle-field as in the time of Frederick the Great; and an over refinement and pedantry crept in as regards battle formations of large masses which were directly opposed to Frederick's simple guiding principle. It was only toward the end of the eighties that simpler counsels prevailed which insist upon the impetuous dash of the first subdivision of the cavalry force. These ideas have found expression in the latest drill regulations. In 1889 the cavalry was equipped with lances throughout, a measure as to the advantage of which opinions are divided.

The tactical development of field artillery revolved mainly about the question as to how far large masses could be combined and handled and what was the organization most favorable for this; also, whether artillery

should, at least partially, accompany the infantry attack or whether it should retain its position. The drill regulations of 1876 and 1889 showed varying progress in the simplification, rapidity and mobility of evolutions as well as in the instructions for the use and handling of large masses.

Long stretches of rapid travel were everywhere practiced and, during the last ten years, a careful utilization of ground has been inculcated.

It has been adopted, as a general principle, that the effect of the latest infantry arms will be to compel artillery to use greater ranges; that smokeless powder gives the artillery disadvantages as well as advantages; that all recent technical changes have not altered the principle of fire by masses which gave such great success in 1870-71. It is also recognized that the hostile artillery is first to be subdued and that only after that should the direct support of our own infantry be undertaken; on the other hand that, in an attack by the enemy, artillery fire must be directed solely upon the attacking infantry.

So much for the tactical development of field artillery up to the present time.

As regards foot artillery, siege and fortress artillery, the sieges of Paris and of numerous other large and small fortifications developed technical artillery experiences which have already been considered. But the investment of Metz and the siege of Paris opened also a new era in fortress war and fortress construction which had the most radical influence upon the organization and use of foot artillery.

During the sieges of the war of 1870-71, so long as it was a question of formal attack and execution of technical work, the Engineer Corps and pioneers showed themselves equal to their tasks. But experience before Metz and Paris showed that they lacked somewhat to be desired in the practical utilization of terrain and tactical training of eye. Effort is now being made, by detailing them for detached service with infantry, to bring pioneer officers into close relations with that arm; and to get out the pioneer battalions oftener for field manœuvres. Moreover the system of intrenchments has been much simplified. In general, continuous lines of rifle pits in their various forms have replaced separate intrenchments with a ditch in front. Cover is to be obtained by digging down, not by shovelling up. The type of field and temporary intrenchments consists of so-called "strengthened" trenches, as deep as possible and provided with covered shelters; combined with isolated inclosed points of support called "infantry trenches." Such works are to be strengthened at suitable points by emplacements for batteries.

The changes which have taken place in fortress construction and fortress warfare are discussed elsewhere.

## WHAT WAR MEANS.

(From the *United Service Gazette*.)

**E**IGHTEEN years have now passed since the close of the last great European war, more than thirty years since the fall of the Confederacy terminated the bloody struggle between North and South in America, and forty years since Englishmen last faced civilized opponents of their own calibre in force. In Europe, in America, in England, a generation has arisen or is arising, which knows not war. In spite of civilization,—perhaps, indeed, because of it,—the combative instinct in the human being has not meanwhile lost its strength. The age of universal peace, for which poets and idealists have longed, recedes ever before the advance of time. The world has for twenty-five years been arming upon an unprecedented scale, and by the general anticipation of all, the time is fast approaching when the human animal will once more be sent to the slaughter. Mankind agrees that warfare is wicked, and yet it fights. For it is useless to denounce an evil unless practical steps are taken to remedy that evil, and in this case that means changing human nature, and remodelling the conditions of existence in this, our world.

It is of the utmost importance that all should know what war means, and a help to such knowledge is afforded by a paper in the *Fortnightly Review*, dealing with "The Human Animal in Battle." It is written by Mr. H. W. Wilson, the talented author of "Ironclads in Action." He reminds us that a few months ago we saw the people of the United States anxious to fight somebody for fighting's sake, though they have themselves had terrible experience of war. But those who have looked upon battle-fields of the Civil War are now passing away. To Englishmen, such a knowledge will be of value in two ways: it will make them anxious to avoid war, in the only way by which it can be avoided,—by adequate armaments; and it will dissipate the dangerous impression prevalent among so many civilians that, as the last resource, we can take the field with untrained men and win. The popular idea of war is largely based upon the popular history, the war correspondents, and the general's reports, in which, for obvious reasons, there is seldom a revelation of the true horrors of the engagement. Our fancy, our imagination are fired by the picture of magnificent chargers, of prancing horsemen, of gleaming bayonets, of heroic episodes; and we flatter ourselves that on such an occasion we, ourselves, should perform with credit. We see little of the dusty, yelling, hunger-stricken, blood-stained line of men who win the battle. And yet we want the horrors, as well as the glories, the actual emotions, the alternating hopes and fears, the agony and death, the wild panic, the triumphant onrush of the fighting line to correct our picture. We require, in fact, the story of war from the private's and the individual combatant's points of view. Such a story will be the most convincing possible argument for peace. Nor will the brave man be less brave because he knows the cup of which he will have to drink. Ignorance is not courage, though it has sometimes served to conceal the want of that great quality.

To make of the ordinary individual a good soldier, the most powerful emotion in the human animal, fear, must be subdued and overcome. Fear is defined to be that reaction which takes place through a sufficiently vivid representation of a possible pain or evil. It is greatest when the evil to be apprehended is most unknown, when danger which has never been encountered before is approaching. War-trained troops, men who have looked upon slaughter and death upon the gigantic scale of the modern struggle, no longer exist, and the peace-trained conscript has no knowledge to correct his fear. The machinery of battle has progressed till the possibilities of our modern weapons are appalling. Torpedoes, monster guns, high explosives, the swift arbitrament of the ram at sea; on land, quick-firing guns, using the deadly shrapnel, are almost untried implements, whose actual effect can only be conjectured. This much is certain, that the future battle will be a severer trial to the nerves than any past encounter. To meet that trial the nerves of the modern civilized man are less fit than they were in the past, as the increasing rush and worry of our existence, the railway, the telegraph, the herded aggregation of human beings in cities, conduce to nervous complaints. The machine moves upon an upward plane, the individual left to himself upon a downward one. To counteract this downward progress training and discipline grow ever more and more necessary.

The decay of religion, which is so widespread a feature of our times, has contributed to the downward progress of the individual, by making death more horrible because of the greater uncertainty of the future beyond the grave. To the Norseman, the Turk or the Christian, death was merely the passage to another and more blessed existence. To the modern doubter it is a leap into the unknown. The joys of Valhalla, the glories of Paradise, the dreamless sleep of Nirvana, or the tortures of an inferno may lie behind the veil; he knows not which. But he is fully aware that with death his present existence ends. All life's pleasures are over forever, and the future is an appalling blank. He will be prone to cling to the uncertainty of the present rather than put upon that may-be-shoreless sea.

Fear is greatest where the imagination is strongest. It is an emotion which seriously affects both body and mind. On the physical side it checks the flow of saliva, and brings that peculiar thirst of the battle-field; it causes organic derangement and a certain degree of muscular relaxation, increases the tension of the voice, and is accompanied by a desperate effort to avoid the danger. On the mental side it paralyzes the intelligence, and leads to the blind desire for flight, though sometimes it goes even further, and deprives the victim of all power of movement. If flight takes place it is the flight of panic, a reflex and often involuntary act. Only strength of will can overcome this tendency to run. As a matter of fact flight is rarely the best road out of danger: in battle it is the worst. To go forward and die is certainly better than to go backward and die; for, in the first place, the enemy who is experiencing precisely the same emotions will lose courage and shoot less steadily, thereby diminishing the risk of the assailant. Nothing is more contagious than panic; a single man with ashen face rushing to the rear will draw others after him and shake the confidence of all



who see him. Hence the problem is how to implant courage and avoid panic.

Courage is simply control of the nerves, and is largely due to the habit of confronting danger. General Sherman thus defines it: "All men naturally shrink from pain and danger, and only incur their risk from some higher motive or from habit, so that I would define true courage to be a perfect sensibility of the measure of danger and a mental willingness to incur it, rather than that insensibility to danger, of which I have heard far more than I have seen. The most courageous men are generally unconscious of possessing the quality; therefore, when one professes it too openly by words or bearing, there is reason to mistrust it. I would further illustrate my meaning by describing a man of true courage to be one who possesses all his faculties and senses perfectly when serious danger is actually present." Pride, habit, duty, these are the forces which enable men to control themselves. All can be fostered and implanted by training. Sheridan reckoned that of able-bodied men about one-fourth have not the requisite capacity for courage, and are, therefore, useless for battle. Such weak hearts must be weeded out. "No matter how brave a veteran may be," says Private Wilkeson, of Grant's army, "he relies on the men on either side of him to stand there till they fall, \* \* \* he must know that his comrades are as staunch fighters as he."

Even in the bravest and most fully tried men fear is subdued and not wholly eliminated. Skobeloff said of himself, "I confess that I am at heart a coward." He despaired of General Gourko because the latter would duck to avoid bullets and shells. In the Northern army, at the close of the Civil War, General Horace Porter tells us that there were only two men known to him who never bowed the head to iron and lead. Of these one was General Grant. So purely a matter of habit, a reflex action, had such ducking become, that after a great battle men would involuntarily bob, as they stood or sat about camp, at the slightest noise.

How, then, is courage to be taught in peace? A Russian general once proposed to "salt" his soldiery by loading one rifle in ten with ball cartridges during manœuvres. This ghastly preparative was too revolting to civilized minds, and it has never been carried out; but if adopted, it would make the army trained under such circumstances invincible, and so in the end tend to shorten war and save life. It would accustom the soldier to the sights and scenes of the battle-field, and overcome his dread of the unknown. It would enable him to control his nerves in the tumult of the actual encounter. Such a pursuit as climbing has the same moral effect. Endurance, mutual trust, self-control may be learned on the high Alps, or, for the matter of that, in Wastdale, where a slip on the face of the mountain means destruction. The volley of stones down some precipitous gully is not less deadly than the hail of shells and bullets on the battle-field. And, in a less degree, hunting, and the manlier forms of athletics, give the same result. Sports involving risk of life are thus of supreme value from the national point of view, and this should be remembered when the ignorant and degenerate assail them.

Every-day experience tells us that courage can be acquired by the great

mass of mankind. At Bull Run, the raw Northern infantry attacked troops of their own quality in position with great spirit. They advanced boldly, till, finding that they were stiffly opposed, though, as a matter of fact, the Southerners were just on the point of giving way, they turned and ran. They were unused to the sight of bloody wounds and death; their loss was respectable; and for all their martial ardor they had not acquired self-control. But take the same infantry at Cold Harbor, seasoned by three long years of war. They were going to assault the most magnificent troops the world has ever seen,—Lee's Southern infantry,—and these intrenched. They knew that their generals were making a bitter mistake, and sending them on a hopeless errand. They were seen in the trenches before the assault, sewing their names upon the backs of their coats, that their bodies might be recognized and sent home after the attack had failed. "The impression," says Wilkeson, who was there and watched that heroic endeavor, "was that the task cut out for them was more than men could accomplish. \* \* \* Though they had resolved to do their best, there was no eagerness for the fray." As daylight dawned, the long blue line leaped up and charged the works. They swept into the first line, but only to be at once driven out. They came back, having in twenty minutes left five thousand dead or dying on the ground; but their failure was not due to want of courage. Years later, Grant, with his own rare modesty and truthfulness, owned that the fault was his, that the soldiers were right, and that the assault should never have been made.

It is an affectation of a certain section of our press to set civic courage—the bravery of the policeman or fireman—above military courage. This, however, is an injustice, because it leaves out of sight the physical conditions in either case. The civilian may be presumed to be well fed, properly clothed, and in good health; the soldier, as often as not, has to fight with empty stomach, without sleep, ill-clothed, and sickly in health. Hunger and sleeplessness are sore enemies to courage, and it has been well said that at no time is a man more likely to play the coward than in the small hours of the morning, before his body is refreshed with sleep and food. The whole vitality is lowered by a long series of campaigns, and by the multitudinous discomforts which man, the animal, must undergo. When the Southern armies were raised for the war with the North, every private appeared with a trunk. He had a change or two of clothes, an arsenal of weapons, coats, pots, and pans galore. He had a negro servant to take his sentry duty and help him to move his goods. To the close of 1861, the Confederate stuck to his baggage. In a word, he did not know what war was like; but he did know what comfort demanded. Then the marching began. The trunks were burnt or abandoned; knapsacks were found to gall the back; a change of clothing was no longer necessary when the soldier had to carry it; great-coats were dispensed with; and most of the arsenal of weapons was sent home. The soldier was left with his hat, jacket, shirt, pants, drawers, socks, and shoes. His only baggage was a rubber and a woollen blanket, and one haversack. His rifle and bayonet were his only weapons, and his cartridges were carried in his pockets. With this equipment he faced the broiling sun of the Southern summer; with this the icy

winter of Northern Virginia. He slept in the open air and never washed. He was reverting to the animal.

To many civilized men such an existence would mean death, and these continuous hardships and discomforts did reduce the vigor of the Southern resistance, by driving many from the ranks, and by disabling all the weaker vessels. Cold, wet, and dirt are three terrible enemies. "Rain," says a Southern private, "was the greatest discomfort a soldier could have,—wet clothes, shoes, and blankets; wet meat and bread; wet feet and wet ground; wet wood to burn, or rather not to burn; wet arms and ammunition; wet ground to sleep upon." Tents are rarely carried in modern armies, and on bivouac no shelter is to be had. Dirt and its concomitant vermin are not less distressing to men accustomed to cleanliness. Worse of all is the want of food. The German Second Corps at Gravelotte marched twenty-three miles without food or water, and then engaged in the terrific combat in the Mance ravine. The French army of Marshal MacMahon for whole days before Sedan, had received no proper rations, and ate what it could, which was very little. To Lee's Southern infantry raw onions were "angel's food," in their own expressive phrase; a few handfuls of unground maize or corn, a scanty rasher of rancid bacon at rare intervals, were all they had to eat. When they received three days' rations they cooked and ate them, preferring to carry them inside and go hungry the two following days. They devoured rats, musk-rats, and squirrels when they could get them. Two days' sleepless marching and fighting without food was, we are told, not uncommon. The soldiers slept as they tramped the dusty roads, and at each halt men fell down in a dead slumber.

Nothing is truer than that a good commissariat wins battles, because with a good commissariat men go into action in good condition. But even with the best possible arrangements, a sudden emergency may arise, and the soldier may be wanted without delay. Imagine him, then, on his road to his first battle, foot-sore, hungry, wet, sleepless, depressed. He tramps steadily towards the roar of the guns with his heart numbed with apprehension. Young, nervous, excitable, he is going to be killed, and for what? The question "*Pourquoi est-ce moi plutot qu'un autre?*" which rose to Maurice Levasseur's mouth under the cannonade at Sedan, must be met and answered. Why should this individual starve, fight, and die, whilst that sits comfortable at home in his easy-chair, and reads of the battle with a pious acquiescence? This life at such moments grows very dear to its possessor, and beyond the grave is what? The loss is immediate and affects him acutely; the gain is remote, and will not advantage him. He is told that he will win glory, but of what use is glory to his clay? He is assured that he is supporting national interests, but what benefit to him, as he sleeps beneath the sod, will the increased prosperity of his country bring? His name will be forgotten, except it may be in one household; his remains will be shovelled hastily away, with a jest, perhaps; and the thirsty earth will drink up his life-blood. Duty, religion, the instinct of self-sacrifice, the fear of ridicule, these are the motive powers which can carry him forward and support him in such moments of questioning. The guns must have their human food.

Alone of men the condemned prisoner and the soldier assist at their own funeral. But so sanguine is the human animal after the first rebound of fear that it can never realize the imminence of death. "After all," each man reasons, "I may be spared." As he nears the scene of action, he begins to discover what war is. "It is not play. It is not pleasure. It is not sport under the greenwood trees, but a savage encounter with desperate adversaries, who deal death and grievous wounds with impartial hands," he will say with Private Wilkeson, as he sees the wounded straggling from the line of battle to the rear, men torn and mangled, as he soon may be torn and mangled; men proclaiming, as the wounded mostly do, that the day is going badly. "I never saw the rear of an army engaged in battle," said Sherman, "but I feared that some calamity had happened at the front—the apparent confusion, crippled horses, men lying about dead and maimed." His first impressions will yet further shake his nerves, and the sights of blood and death will sicken him.

What are the first sensations of the battle-field? Zola, Tolstoi, and Stephen Crane have imagined them, and combatants have written them. "Something whizzed past me like a big bluebottle on the wing," says Lieutenant Herbert of Plevna fame, "and the current of air caused by its rapid passage touched my ear. Another—another. All at once I realized that these were the enemy's bullets, and the discovery brought on a violent sudden attack of cholera-like disposition." The passage may be compared with Zola's description. "The now constant hissing of the bullets, with their sharp ping or buzz whispering around and sometimes into us, gave me a sickening feeling and a cold perspiration. I felt weak around my knees, a sort of faintness and lack of strength in the joints of my legs, as if they would sink from under me. These symptoms did not decrease when several of my comrades were hit," says Mr. Lee Goss, a former private in the Army of the Potomac. No one quite knows how he will behave. "No man"—I am quoting Wilkeson's stirring narrative—"really enjoys a battle. One has to string up his nerves and take a firm grip on himself morally, and hold himself in the battle-flames for a few moments until warmed to passion. The impulse is to run out of danger."

If the raw soldier is there and then led forward against the enemy, the trial to his nerves will be less severe than if he has to wait under a heavy shell and shrapnel fire to which he can make no reply. In the one case he will be moving and occupied, in the other case he will only have his danger to think about. This was, perhaps, the reason why, in the war of 1870-71, the German soldier rushed impatiently against the French positions. "The beat of the drum went before the thunder of our guns, and our power was shattered by the fire of the foe's unshaken infantry." He was anxious to end the period of tension, and to come to hand-grips with the enemy. But he paid, and paid very dearly, for his impatience.

No words can depict the uproar and confusion of a battle-field. The tremendous thunder of the guns, the roar of bursting shells, the incessant roll of musketry, the dense clouds of dust, the yells of the combatants, the shrieks and groans of the wounded, the ghastly human fragments strewing the earth, the smell of sweat and powder, making up an appalling ensem-



ble. With smokeless powder the whole battle-field will be visible, and there will be no screen between the fighters on either side. The pomp and circumstance of the battle will be more impressive; the combatants will be in sight of all field-glasses, and this may stir and move them to extraordinary efforts. Nowhere has man such a theatreful of spectators, nowhere such a background for his action. Picture the German artillery in action at the St. Hubert Farm during the battle of Gravelotte, under the eyes of the old king, his brilliant staff, and the vast German army. "The horse artillery battery taking ground to the south of the main road, moved like lightning through the hell of the French fire. The wheel could be observed from Gravelotte (where the king stood), and all hearts throbbed to see what would be their fate. Would they be able to form line? The battery commander, who was leading at a headlong pace, with a sign of his hand swung the battery round as if with a magic wand, until it faced Moscow; every one was at once off his horse, and all six guns let fly immediately. \* \* \* But gradually the battery leader saw his battery melt away; the heap of dead horses in the rear continually increased, whilst between the guns there was a confused mixture of dead and wounded of both armies. The fortunes of the battery had been from the beginning watched from Gravelotte as it dashed forward from the defile like a column of dust driven by a hurricane; it could be seen with glasses how gun after gun was silenced, and how the living organism changed into a motionless, dense, helpless mass." One great action adds distinction to every life; to have been a protagonist on such a stage and at so decisive a moment, when the French counter attack was curbed and driven back by the tremendous fire of this battery and its supporting guns, was indeed glory to the survivors. But what of that "motionless, dense, helpless mass," torn by shell and bullet prone behind the battery? What of the limbs and bodies which had been men, thrown fifty paces apart, and strewing the terrain? "A desert covered with corpses" is the effective German expression. But it is on deserts covered with corpses that the foundations of empires are laid.

The human animal gains confidence from comradeship in death. It fears to cross that dark river alone. It gains redoubled assurance from the bearing of the higher intelligence, the ideal courage represented in the officer. The presence of Napoleon on the battle-field was worth—Mr. Wilson believes it has been calculated—ten thousand men. The presence of the general at the front endears him to his soldiery, who see that he is facing their risks, enduring their dangers and hardships. No complaint was so frequently made against the Northern leaders in the last year of the Civil War as that they did not expose themselves to risks. It was not a fair complaint, as many Northern generals were killed and wounded, and the leader has to be careful of risking his life, but it was made. The Southern generals, on the other hand, were reckless of their lives to an extreme degree. "Stonewall" Jackson, in his furious assault at Chancellorsville, moved with the advance of his troops, and paid the natural penalty. Longstreet and Johnston were repeatedly wounded. Five Confederate generals fell at North Anna, and many more were wounded. Yet by this exposure of their lives they made the Confederate soldier what he was. It is, indeed, on record

that on one occasion Lee put himself at the head of his troops for a desperate charge, and that his men demanded that he should not risk his life, raising the cry of "Lee to the rear." He obeyed their command, and they delivered their charge with success. But these were war-trained veterans, and Lee was the trusted hero of the Confederacy.

It has been said that the worst man makes the best soldier, and certainly the view which would send the refuse of the nation to the abattoir has much to commend it. But the times have changed since the days of the Peninsula War. Long-service troops have vanished; and to replace them the pick of every continental nation is in the ranks. Unfortunately, too, "worst" is a very vague and indefinite term. If worst physically is meant, such indifferent material will not stand the hardships of campaigning. If worst intellectually, it will be beaten by the superior intelligence of its opponents. If worst morally, it will want courage and backbone. The North attempted to utilize the dregs of its population in 1864-65 with the most convincing result. The criminal or pauper recruits who "jumped" bounties had to be sent under vigilant guard to their regiments. They were driven into battle by armed pickets and provost-m Marshals behind the fighting line. They were faint-hearted and stupid. They skulked persistently when they could, so that great hordes of "coffee-boilers" gathered at the rear during every encounter. They weakened the line of battle. In the words of Wilkeson, "take away the volunteers from the Army of the Potomac, and Lee could drown the rest of his army in the James River without firing a shot." But for the percentage of volunteers in the ranks, these cuffed and despised creatures would never have fought at all. The great mistake made by the North was in not resorting to conscription at once. Volunteers were called for first of all, and thus the brave, the ardent, the heroic, instead of leavening the great mass, were drawn off and dashed to pieces against Lee's intrenchments. The indifferent material in the hastily-raised French levies of the winter of 1870 was doubtless one cause of their easy defeat. Nothing could be expected from the mobile whose ignoble song was,—

*"Tant pis pour la Patrie,  
Sauvons, sauvons notre vie!"*

of whom an eye-witness said "*Rien ne bat chez eux: pas de sentiment du devoir; pas de sentiment de la Patrie.*" The system of recruiting in France, as in England to-day, has absorbed the pick of the combatants into the regular army. The French regular trained soldier did not fail in courage on the battle-field: it was the collapse of organization and generalship which brought his country defeat.

The religious and reckless man—the latter of whom is far from being in any sense the "worst"—by general consent make the best material for the soldier. War demands the sacrifice of the noblest natures. Sergeant Forbes Mitchell has given us a wonderful picture of one of the old "powerfully prayerful" Highland regiments, who for stiff fighting were unequalled. They were organized as a parish with ministers and elders, and they received communion before they fought. Like these were the men of the "Stonewall" brigade in the Civil War. Alas! they have vanished forever.

It is, as it were, a glimpse from the old world which sorts ill with these latter days. In Lee's army during the last hopeless months of the struggle, with the growing conviction in each man's heart that he was doomed, came a great religious revival. Men ceased to fear death, believing that sooner or later they must be killed, and that the date, the hour of their fate was "unalterably fixed." They looked at every moment for portents and for the visible hand of God. A hen, it was reported, had laid an egg with "peace in fifty days" written upon it. Their faith grew with every disaster. The future in this life was a void blank; they were living in the presence of eternity. Their moral condition will explain their terrible efficiency as a fighting force. They were soldiers indeed.

In every battle there must come a point when the strain upon the combatants of one side or the other becomes greater than they can endure. In a word, there is a breaking point. No race and no nation has a monopoly of courage, though the individual animal will in some cases be better than in others. The strain is constant for a certain degree of training or courage in every age; modern weapons kill and mangle. They can do nothing more. The first emotions of a charge or attack are intoxicating in the literal sense. "The rest of the assault is blurred in my recollection; I remember but the main features," says Lieutenant Herbert of the desperate attack on the Kavanlik redoubt at Plevna. "Awful rifle-fire from Kavanlik trenches—guns discharge at point-blank range—gaps in my line—bugles sound 'storm'—bayonets fixed and wild cries of Allah—our skirmishers fall back and mix with main body—we are now in front line—troops get into confusion—brief and desperate encounter in last trench—we proceed to leave third trench, but lines falter under the awful fire from redoubt. We retreat to trench, where we come to a full stop." So in a few words is compressed a world of human agony and woe. As the losses become heavy men awake from their intoxication, fear assails them, and they begin to drop behind and skulk, lying flat on the ground. The German skirmish-lines in 1870 left hundreds of such wounded men in each copse and hollow of the ground as it moved forward. In vain the officers used their swords upon them; their nerves would not stand the strain.

Heavy loss brings the line up quickly, if it is inflicted in a short space of time. The 38th German Brigade at Mars-la-Tour checked at a loss of about 29 per cent., and seeing a French force advancing to a counter attack turned and ran. The Prussian Guard at Gravelotte gave way under a loss less than half as heavy. In each case the troops engaged were fighting their first action, but it is impossible to discover why, in the one instance, men could stand more than presumably picked troops of their own race endured in the other. There must have been some explanation, but it is not apparent, unless, indeed, the guard saw that the attack was hopeless, and refused to go forward; such incidents happen in war with the most experienced troops. At Petersburg, in the American Civil War, before the assault the men of a brigade famed in the Army of the Potomac for its desperate courage, when asked whether they were going to charge, said, "No, we are not going to charge; we are going to run towards the Confederate earthworks, and then we are going to run back. We have had enough of

assaulting earthworks. We are tired and hungry, and we want to rest and eat."

Not the least terrible trial of the battle-field is a rout with the enemy in pursuit. The passage of the Beresina will to all time express the extremest intensity of mental torture. At such a moment men think only of themselves; panic usurps the place of reason and duty, and to escape from the imminent danger at the cost of whatever effort is the only purpose of the mind. They discard their incumbrances, their weapons, and even their uniforms. At Gravelotte the shattered German infantry burst from the wood in the Mance ravine, panic-stricken, wild with fright, deaf to their officers, devoid of all self-restraint, and charged upon their own guns and upon the king, whose presence failed to restrain them. At Plevna, when the first Russian attack recoiled, the soldiers were seen running without caps, rifles, boots, or coats, whilst their officers in vain strove to rally them. "I had never been in a general retreat," says Lieutenant Herbert, "and I do not care to dwell upon it, as it is far more terrible than the most desperate encounter."

But war would be comparatively humane if it were not for the fact of the wounded. In future battles with the great range of the present small-bore rifle, it will be almost impossible to give satisfactory first aid on the battle-field. Field hospitals will have to be farther towards the rear, field ambulances will not be able to approach closely the fighting line. The wounded will have to lie longer where they fall, and more men will be wounded and fewer in proportion killed outright by the small-bore bullet. They will be exposed to fresh injuries from the hostile fire and from the movements of cavalry and artillery over the ground. The surgical resources of an army are strictly limited, even if the injured could all be brought in, and can only deal with a given number in a given time. In the Franco-German War the doctors had not finished their merciful work at Mars-la-Tour when they were wanted at Gravelotte. After days of work at Gravelotte they returned to the field at Mars-la-Tour, where they found men still living in agony with festering wounds. Others had ended a life hateful beyond imagination with their own hands. Among the list of missing, whose fate no man knows, there are many such tragedies. Those who creep for shelter from the sun to some copse or corn-field, who escape the anxious search of the ambulances, are the true victims of war. "In the burning heat of midday, in the dark shadows of midnight, crouched on stones and thistles in the stench of corpses around and of their own putrefying wounds,—a prey whilst quivering for the feasting vultures,"—without water, without food, without help of man to assuage their torments, what to them is the meaning of glory, and what in this life their reward? At Sadowa sixty wounded were found in a barn six days after the battle. They had lived God knows how. When found, the state of their wounds was such that not one of them could hope to survive. In the terrible battles in the Wilderness, during the Civil War, the woods caught fire as the two sides fought, and the wounded were consumed by the flames. Dreadful, perhaps; yet was this fate more dreadful than that of those who had crawled clear of the thickets and "were eaten alive by the beetles o'



nights"? "The wounded," says Wilkeson, "were haunted with the dread of fire. \* \* \* Their hearts well-nigh ceased to beat when they thought they detected the smell of burning wood in the air. \* \* \* I saw many wounded soldiers who hung on to their rifles, and whose intentions were clearly stamped on their pallid faces. I saw one man, both of whose legs were broken, lying on the ground with his cocked rifle by his side and his ramrod in his hand. \* \* \* I knew he meant to kill himself in case of fire." At Cold Harbor the men who fell between the lines on the first day were left by either side to die. For war makes the human animal indifferent to others' pain and suffering and careless of the single life.

No wonder that with knowledge such as this, at the Geneva Conference, Mr. Twining proposed to end the miseries of the hopelessly wounded by giving the *coup de grace*. The time may come when such a measure will be permitted; now it shocks our squeamish humanity which cannot bear to read of such things, still less to think of them. The time, too, may come when we shall devise some means of saving life in a battle at sea, or arrive at some international agreement. When Mr. Wilson recently urged this necessity, a critic objected that those in battle-ships have other things to do than to rescue the drowning. As if it were not possible to have Red Cross vessels with each squadron whose one work should be life saving. But it seems governments and admiralities have no time for such merciful thoughts as these. Yet for bare economy's sake it will be mad folly to allow our precious sailors to be needlessly drowned: and it might lead to something very like the trial of the twelve generals at Athens.

Humanity condemns war altogether, and yet war persists. It has become more dreadful if slightly less bloody, with the advance of civilization. Shall we ever be rid of it? Not, perhaps, till the whole world is regenerated, and till anger and passion disappear from the hearts of men. It is, after all, only the continuous inevitable struggle for existence carried to its bitterest extreme and in its intensest form. We may, and with justice, denounce purely offensive war as wicked and unnecessary, but the old question will crop up, What is a purely offensive war? Peace, too, has its horrors: there are many employments and manufactures which exact a certain annual sacrifice to human life, and yet the shareholders in railways and electric-lighting works, the owners of white-lead works, are quite content to draw their profits. War is a national speculation upon a gigantic scale, and if the statesman of the Bismarck type sees profit to be made by it he will enter upon it without compunction. Peace societies by deprecating armaments only now do mischief to the nation where they make converts. Our sole road to peace with the present condition of the civilized world is to render attacks upon ourselves unlikely to succeed, and therefore inexpedient from a business point of view. Nothing is more dangerous than the unguided emotionalism which denounces armaments. Conscription by exposing every adult male to the risk of wounds or death will make even the armed nation reluctant to go to war.

The brutalizing effect of war upon the individual character is an ascertained fact. On the other hand, the training for war, as it is understood on the continent, brings great national advantages. It promotes physical well-

being by giving the recruit healthy out-door life at a critical period in his existence. It teaches discipline and obedience, virtues which are of immense value in civil life, and which in Germany have raised the efficiency of the working class to a remarkable extent. It does for the character what the primary school does for the intellect, and produces a stiffer and stronger type of man. Sooner or later, unless we have resort to it, we shall be driven from the field. Only by it can we fully man our navy as we ought, and only by it can we provide a strong army as we ought, and only by it can we provide a strong army to hold for us our dependencies in the hour of attack. By making such provision we shall be serving the cause of peace, and assuring the fulfilment of the prayer, "Give peace in our time, O Lord."

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## COVER, SCREEN, AND ILLUSION.

BY MAJOR M. MARTIN, R. E.

*(Lecture delivered at the United Service Institution of India, on Friday, 29th May, 1896.)*

**B**EFORE approaching the details of these subjects it may be advisable to touch very briefly on the larger conditions governing all field-works and all utilization of cover, as, being inseparable from strategy and tactics, there is always a great temptation to stray into these wider fields.

These large considerations have been recently so well treated by competent writers at home and abroad that it may be safe to assume the following propositions as governing the subject.

Strategically a defensive campaign is almost invariably disastrous, and small beginnings in defensive works have a tendency to grow into a purely passive resistance if allowed to control the plans of commanders, as at Sevastopol, Plevna, Metz, Placilla, Vina del Mar, and wherever entrenchment has formed the sole policy.

Tactically it is equally true that excessive resort to defensive works and cover has often caused a paralysis of offensive vigor acting injuriously both on the mobility and the *morale* of troops overaddicted to cover, and destroying their value for attack.

It may be assumed, therefore, that tactics absolutely overrule field engineering, and also that field cover and its provision or utilization is not the exclusive function of technical experts, but a part of the fighting tactics of all three arms, whenever applicable to the tactical purpose immediately to be pursued.

"Master the spirit of tactics," it has been said, "and the details of defense will come of themselves."

This paper only attempts to deal with details, subordinate to the spirit of the foregoing.

## COVER.

While the principles of obtaining cover from fire must generally remain the same, and consist of interposing nowadays, as before, a more or less impenetrable mass or substance between ourselves and the enemy, it is probable that details of field cover will now need absolute modification in view of war against an enemy provided with the most modern artillery.

The causes of revolution are chiefly increased accuracy and range, but "cover" itself is more affected by the greater power and penetration of projectiles by improvements in fuse ignition, by the use of high explosives, and by the probable use of howitzers with more curve in the trajectory and throwing more powerful shells, common and shrapnel.

Shrapnel, originally a British invention, at first made its way somewhat slowly in continental armies, but at the present day its use and development abroad may wisely be assumed to equal the effectiveness of our own shrapnel.

Smokeless powder will give some slight extra concealment to both sides from counter observation, while generally increasing the accuracy and rapidity of artillery fire by the removal of the obscuration of the smoke.

Formerly, in artillery duels, the guns themselves suffered comparatively little loss. Great losses have usually been in men and horses, and these have compelled the withdrawal of the guns, usually uninjured.

With high explosives it will be more common for the guns themselves to be destroyed or disabled, and this perhaps will somewhat shorten the artillery duel, and render infantry action possible at an earlier stage.

It may be possible to overrate the power of modern artillery as well as to underrate it, or fail to calculate the advances made in that arm.

One writer anticipates that in the next war we shall see half an army corps put out of action in a short time, by the fire of artillery alone.

Another more moderate exponent says "Skeptics as to the power of modern artillery would be at once converted could they see 100 guns in one line, under one control, occupying a frontage of one mile and distributing their fire as required to every point in the field, varying the nature and object of the massed fire as the controlling head may direct.

It is some such concentrated and increasingly powerful effect which may now be expected from an opponent's artillery and it would seem, therefore, that the protection afforded by walls, buildings, and revetted works, will specially need revision as adjuncts to field defense. Earthwork, etc., admits of easier modification to present conditions by adapting it to the scale of penetration (as far as time will allow of such greatly increased labor), but cover actually standing will always be useful provided it still affords a protection and does not add to the destructive effects of fire. See Fig. 1.

For instance, a house or high brick wall of  $1\frac{1}{2}$  brick thickness now becomes worse than no shelter at all, if its occupation be known to the enemy, for it is evident that under modern shell fire the effects of a bursting shell are doubled by the flying fragments of masonry, crumbling roofs and falling beams adding to the confusion and alarm.

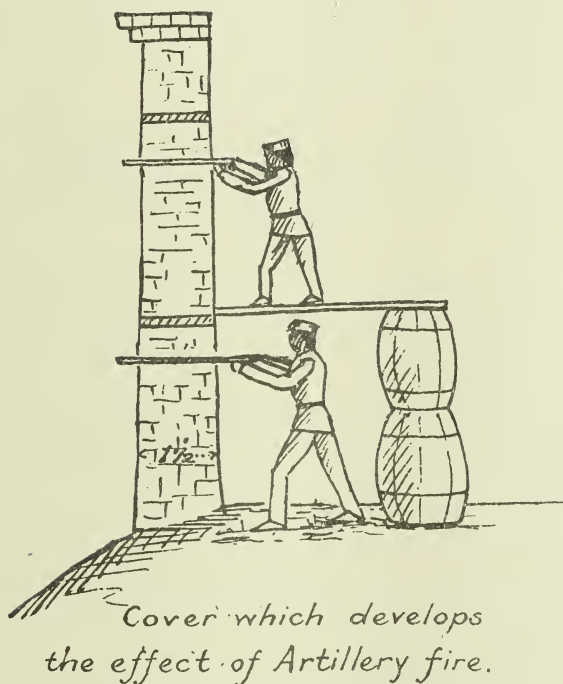
It would even appear that common shell charged with high explosives

requires weak cover to develop its full effect, for it is said to be less destructive to infantry in the open than is shrapnel.

On the other hand where a building is of the average strength of a church, its walls will continue to afford protection to the inmates from field artillery, and hence classification becomes increasingly necessary.

But while the direct lining of thin walls by artillery and infantry would now seem to be worse than no protection, it does not follow that even weak walls and houses offer no protection in any position. On the

Fig. 1.



contrary they would still protect sensibly the flank of any troops at some slight distance from them, and even if easily demolished would require time and expenditure of ammunition to destroy before the flank became again vulnerable.

It is also probable that a house once reduced to a heap of débris, would then become more tenable by infantry as a heap than it was before as a shell trap.

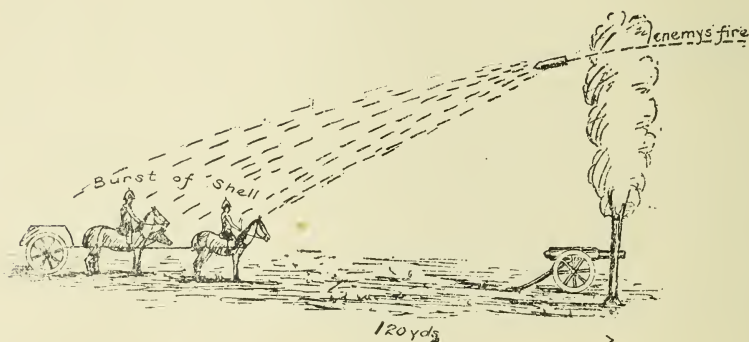
This again leads us to the question whether it is now always worth our while to level all houses around a defensive position, since by so doing the



demolished houses might give better cover to the enemy than they did when standing'?

As regards the tactical utilization of standing houses and high weak walls by advancing artillery, it would sometimes appear feasible to interpose such between themselves and a hostile battery, still keeping their immediate front clear for fire on the enemy's infantry or other detailed objective; but the protection must be carefully thought out, or it may prove delusive. See Fig. 2.

Fig. 2.



In 1870 a French battery of horse artillery was engaged after selecting as a position a line of poplars, the thick trunks of which afforded at their bases good cover for the gunners; but after an interval the enemy's shells (fired with percussion fuses) were found to have nearly exterminated the limbers and wagons to the rear.

This was of course due to the shells bursting on contact with the boughs of the poplars, and from thence the splinters ranged well for the teams and wagons as they were placed. This is an instance of very defective cover which would often require careful watching to avoid.

Such an effect might as easily be reaped from the ridge of a high pitched roof or any penetrable screen which just bursts a shell conveniently for the enemy, and it would appear that officers should avoid halting troops 100 to 150 yards in rear of any screen that will just serve to burst a shell.

Again it is probable that the occupation of the *lisiere* or border of a thick wood would now be a most delusive protection from artillery fire as falling limbs and branches would largely multiply the ordinary effects of shell fire on the supports and reserves in the wood behind.

The whole question of forest defense appears to be one little studied or provided for in the British service. In this matter as in other defensive works we are apt to assume lightly that troops can easily perform individual tasks which are in reality immense.

It is often recommended to form clearances which would involve felling many acres of forest, and though gun-cotton necklaces might be partially employed, the majority of the trees would have to be felled by the axe. Our

British battalions have few axes and little practice in their use, and the work would probably disappoint expectation. Canadian or Australian lumbermen or backwoodsmen would give an excellent result, but it would be useless to expect much skill at the axe from a young British battalion raised perhaps from a midland town and consisting (as one of them does) almost wholly of shoemakers ! Others would be weavers, machinists, etc., according to the trade in the town where the battalion is raised.

Foreign nations have a larger element of forest born recruits, better fitted to deal with such eventualities, and this is true of America also ; but we can never be sure a future campaign will not be in forest country, and it would appear advisable to develop the existing organization of infantry pioneers so as to act as instructors to a larger proportion of the bulk of the infantry. This system is indeed laid down in the Queen's Regulations, but little has been found possible, far less has it been found feasible to develop further the system of instruction foreshadowed.

In this connection it seems rather an error to suppose that picks and shovels are the sole tools useful to infantry. It all depends on the country. In many cases axes and saws would be far more useful. In a loose sandy desert, for example, picks would have no value, etc.

The conditions and circumstances of the country of campaign govern largely both the instruction necessary and the needful equipment. It has been said that a good officer for an engineer park, for instance, is one who, starting with a full equipment, knows what to throw away, and when it would be advisable to do so !

The outer edge of a village towards the enemy would seem only to invite common shell with high explosives nowadays.

Noisseville and St. Privat, though strongly built, were easily destroyed by the Prussian artillery of 1870.

Authorities agree in recommending as a defense a thin firing line slightly in advance of the village, which, from the enemy's position, would be undistinguishable from the actual occupation of the outer edge, combined with a strong occupation of the near half as an interior retrenchment, and if supported by guns these should be placed on the flanks clear of the village itself. See Fig. 3.

Such a scheme of defense is a mixture of cover and screen, the advanced half of the village A and B being surrendered to the enemy's artillery, and should this half be destroyed by fire with flat trajectories, it would probably form when levelled a screen and glacis for the interior retrenchment C and D, and the assaulting columns of infantry would find the post still tenable and, possibly, even strengthened, by the enemy's direct fire.

This would not be the case with curved fire from howitzers, and the weakness of direct fire in dealing with skilful defenses has pointed to a probable larger employment of the howitzer, and has directly led to the use of high explosives in shells.

The defenses of Plevna caused the Russians to raise their artillery force to the proportion of 8 guns per thousand infantry, an almost unheard of average, and, when the march on Constantinople commenced and continued, a large proportion of this artillery had to be left behind. It is prob-

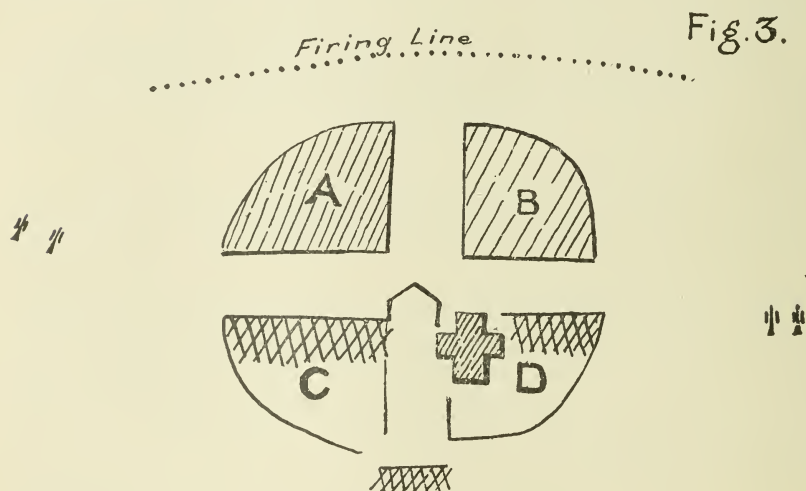
able, therefore, that in future wars every effort will be made to bring a very large artillery force into action in the first engagement, especially against a defensive position, and this force will, it is said, comprise besides howitzers, guns stronger than ordinary field or even position artillery.

Besides the weight of such guns themselves, increased power in shells means increased difficulty in transport, and the heavier natures of ordnance may have to be abandoned if the subsequent campaign becomes one of march and manœuvre.

Such conditions will react on "cover" and affect its use.

Hitherto high explosives have not been considered absolutely safe in transport, though they were both carried and used by the French mountain artillery in the Madagascar campaign with absolutely shattering effect against the Malagasy positions, which were hastily abandoned under such novel stress, a stress which will prove trying to far more seasoned troops than the Hovas.

Probably one of the most delusive forms of protection that seems to offer itself is the reverse slope of a hill. Such a slope often coincides with



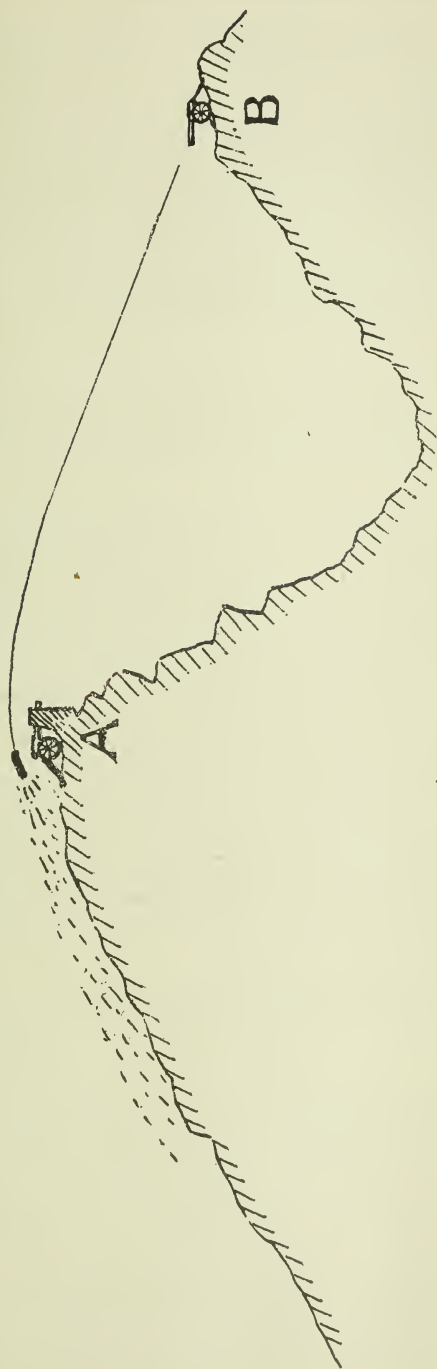
a falling trajectory and adds to the loss sustained, although from the reverse slope the enemy is invisible, and it would in the old days have been held to be defiladed from him.

Such a case occurred at the action of Tashkessen, which I propose to notice later, on other grounds. See Fig. 4.

A Turkish battery at A was engaged with a Russian at B and suffered the most of the two. The Russian trajectory searched the higher position, and the Turkish fire was plunging and therefore little destructive, yet by general rule the Turkish position was "defiladed" and the Russian position absurd. In practice General Baker was surprised to find the results entirely contrary to his expectation.

The enemy's artillery may be supposed to be in action at many and

Fig. 4.



varying ranges, giving varying falling trajectories, and as howitzers have a steeper falling trajectory than ordinary field-guns, a slope which protects from one given fire, may be searched by another, and general opinion now seems to point to the impossibility of providing in the field head cover of sufficient strength to resist common shell with high explosives, if indeed such cover would not add to its destructiveness.

Earthworks with increased thicknesses will give the same protection as before.

Some authorities desire to double the thickness, in order that a single shell may not sweep away the whole cover at any particular point. Others abandon the contest and desire only lighter cover to resist infantry fire and shrapnel.

As regards natures of soil, while clay or hard soil can be blown away by shells in pieces, light soils or sand are less destructible, as shells bury themselves therein, and, even if they explode, form a



temporary crater into which much of the expelled sand falls back again, leaving the parapet much as before.

Shells with delay action fuses are more apt to become buried than those fired with direct action ignition.

It may appear superfluous to refer to snow as a protection were it not that history points to so many examples of actions fought on snow. Leaving out mountain ranges (which are frequently disputed) it would appear as if campaigns begun in the spring or summer, are often prolonged beyond expectation till winter sets in, and thus without going back to Hohenlinden, we find the campaigns of the Crimea, of Paris, of the Loire, and of the Russo-Turkish War, all prolonged into the winter, and snow therefore a factor.

A snow parapet is therefore by no means an impossible or unlikely factor in defense, and though I believe the test has not been tried, it is quite conceivable that a shell which was gradually deprived of its momentum would not explode but be smothered, thus giving a greater advantage to this form of protection.

Marshy or loose sandy ground in front of a position will probably be, relatively, a greater protection than formerly, as the smothering of shells having a wider radius of destruction will be increasingly important.

I have purposely avoided so far, any consideration of musketry, partly because protection from shell fire includes protection from musketry; but more because it would seem impossible to maintain troops in purely musket proof cover during the preliminary artillery action, where their presence is known or can be ascertained, and if Captain Maude is right in assuming that half an army corps may nowadays be rapidly annihilated by artillery fire alone, it would appear that the infantry action may be allowed to take whatever course is possible, after the artillery is subdued or exhausted wholly or partially. Into this phase of the action the same guiding conditions will not enter, and cover which is unsuitable, while under artillery fire, may again be utilized and always may be utilized when unseen or unguessed, or to gain certain advantages in defiance of the risks.

These risks we had best understand to value duly.

Artillery can never replace infantry, and I should have added to the postulates of this lecture by saying it is only held to prepare for the action of infantry when possible.

This prescribes a probation of impossibility for the infantry, during which, however, it must move to such positions as it can act from, exposed to some certain artillery fire, and a further uncertain amount which it hopes to dodge or avoid incurring. Actual infantry bullet fire, while it has enormously gained in range and intensity, and to a certain extent in penetration, cannot be said to have revolutionized the profiles of cover necessary for intrenchments, villages, etc.

Our own army has had no recent experience of meeting artillery fire in the field, and it will require not only great forethought, but will form our first consideration how to deal with the artillery phase of the action, utilizing cover as tactics may dictate, and never forcing the tactical con-

sideration into subordination to academic perfection of defensive details.

From the foregoing it would seem advisable first, to eliminate from our books and courses of instruction all models and details which have become not only obsolete but positively dangerous; second, to carefully discriminate between war against a savage enemy consisting of infantry alone, or infantry and cavalry; and third, it would appear that these details of cover should be dealt with more in a tactical spirit and with reference to the two kinds of warfare in separate columns, as otherwise one paragraph must be corrected by the next to qualify the use for which any particular model is suitable.

As, with your permission, I propose to deal shortly with the protection to and from artillery by "screen" and "illusion" I will only lightly consider "cover" as required in savage warfare.

Here our experience has been recent and thorough,

The siege of Chitral reads much like a chapter of mediæval romance; we hear of the water tower and the close approaches, and doubtless the garrison would have welcomed moat, barbican, and portcullis, had they been thoughtfully provided by their predecessors. The employment of advanced fires to light up the enemy and obscure the defenders was both curious and instructive, and was a makeshift use of the same principle which we may expect to see further developed in the use of the electric light.

In various climes we have learnt to know the laager and the zareeba, the sangar, and the boorj, and to adapt them to our own use.

One great principle runs through all these defenses however.

Under artillery fire they would all be shell traps either from the material of their construction or the closed formation of the troops occupying them, but when rushes of overwhelming masses armed with the sword or assegai have to be met, protection takes the form of a high wall, thorny fence, or delaying obstacle or entanglement, and the spade and earthwork are comparatively useless and indeed should be almost forgotten, earthworks *per se*, being most easily rushed, as were nearly all our posts between Chaman and Candahar after the reverse of Maiwand.

This last appears an example of officers taking models from the books to oppose rushes, where the model is only designed to minimize infantry fire; and is an instance in point as to a more tactical arrangement of class books on fortification being needed.

All countries do not offer the same possibilities for erecting zareebas (where thorns are required) or stone walls, which last are not easily erected rapidly of sufficient height to keep out a rush.

Where boulders and thorns are both available, there is a possibility of making a wall very rapidly which is commonly used in the Meranzai valley, but perhaps not so generally known as it deserves to be. See Fig. 5.

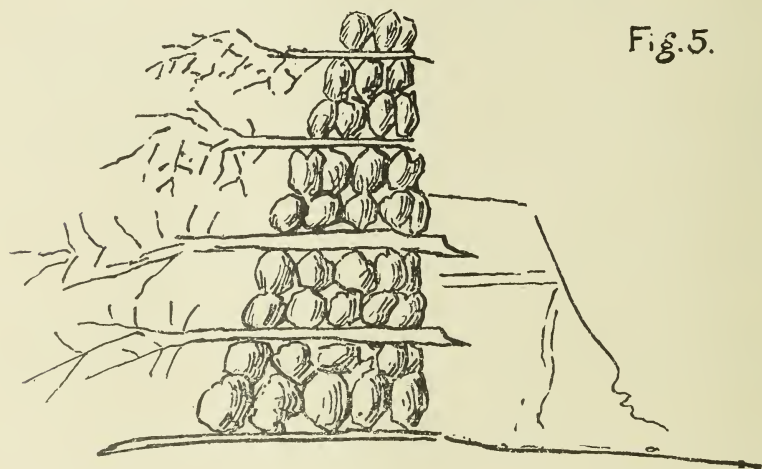
A boulder wall is made 3 feet thick and 2 feet high. Branches of thorn are then laid over it, the butts inwards and the thorns towards the enemy, binding the boulders together. Two more feet of boulders are added, then another layer of thorn and so on, tapering the wall slightly. The whole is raised to 9 or 13 feet and forms an excellent protection from a rush. This

wall however would be an example of the worst cover one could possibly provide against artillery, when such 'a neighborhood would be most undesirable.

It sometimes falls to the lot of officers in savage warfare to consider the question of cover for pickets on difficult and broken ground. This is a vexed question, and it is most questionable whether entrenchment is usually desirable for pickets at all under such circumstances.

They become less watchful, are sometimes inclined to line the entrenchment and fire without cause, they hold their ground perhaps after their flanks are turned and become isolated, and, by absolutely fixing the position of the picket, very tangled ground may be less perfectly watched.

Where required to fight a delaying action, rather than to watch, cover would be desirable, and in this respect again, savage and civilized warfare would appear, as a general rule, to point to opposite measures.



Miranzai Wall

Obviously "trace" is less affected by modern improvements and remains roughly the same, while "sections" or "profiles" are greatly modified.

The next consideration I have endeavored to lay before you for discussion is that of—

#### SCREEN.

When it became obvious that, both in permanent and field fortification, no structure could be erected which could not ultimately be pulverized by artillery, there were not wanting officers who prophesied that the future fortifications would be of paper or canvas, merely to screen from view, avoiding structures which were only blown about one's ears. This view is, of course, fallacious, as fortifications are meant to protect for a time, delaying the enemy, and absorbing time and means even if eventually reduced, but there is more than a grain of truth in the suggestion that it is most important to screen from sight and observation.

In coast-defenses much work is now expended in defeating observation

sometimes by planting trees and creepers, by coloring, by studiously confusing crest lines, and obliterating traces of recent earth-work.

Dover Castle is a good example of successful concealment, as any one may test by trying to pick out the position of the guns on that height when crossing from Calais. The western heights, on the contrary, are rather plainly detected, and the gun emplacements can at any rate be guessed.

In the field use of artillery, it may be possible to adopt some variations of these methods of screening to obscure the position of batteries, and with smokeless powder observation will become more difficult.

Hurdles, for instance, would form a screen not subject to the disadvantages of a brick or stone wall under fire, and it is possible that canvas screens of a suitable tint might be used both for the guns and the ranging parties, especially where natural cover does not exist and where, as in the desert, mirage assists to defeat observation.

Sir George Clarke says "against artillery fire invisibility is the best form of protection, and even when the field howitzer makes its appearance, well-concealed defenses will have little to fear."

Balloons of course may aid in discovering concealed defenses, but, generally speaking, at the present ranges, observation is most difficult and the presence or approach of artillery is more guessed at by indications than actually foreseen.

Long columns on a road, high thick clouds of dust, small ranging parties, are seized on as betraying the action of guns to follow, but all of these can sometimes be screened, and all of them can be imitated in wrong positions so as to aid in confusing the enemy.

All sportsmen who have used a glass in detecting game on a hill side at some distance, know what a difficult and protracted task it is and what special aptitude it involves. It is so easy to mistake one indication for another, a branch for an antler, a bear for the shadow of a rock, or what not, and the resemblance of an alligator to a log of wood is well known. See Fig. 6.

Hence, surely, where we have a ready means of deceiving an enemy by screening and illusion, and no effectual mechanical means of resisting his artillery fire when once brought to bear, we should utilize all measures for obscuring our own forces, simulating strength elsewhere and frustrating the enemy's purposes by every feint and concealment available.

Screens are formed frequently enough of cavalry, light troops, or of all arms; and a good instance of this last form of screen is found in the action of Tashkessen, which is further interesting as the last occasion on which a British officer commanded in an action against European artillery—the most recent, and yet nearly twenty years ago—and in addition, it illustrates the possibility of material force being arrested by skill, character, and determination.

The causes that led to this action may be rapidly summarized.

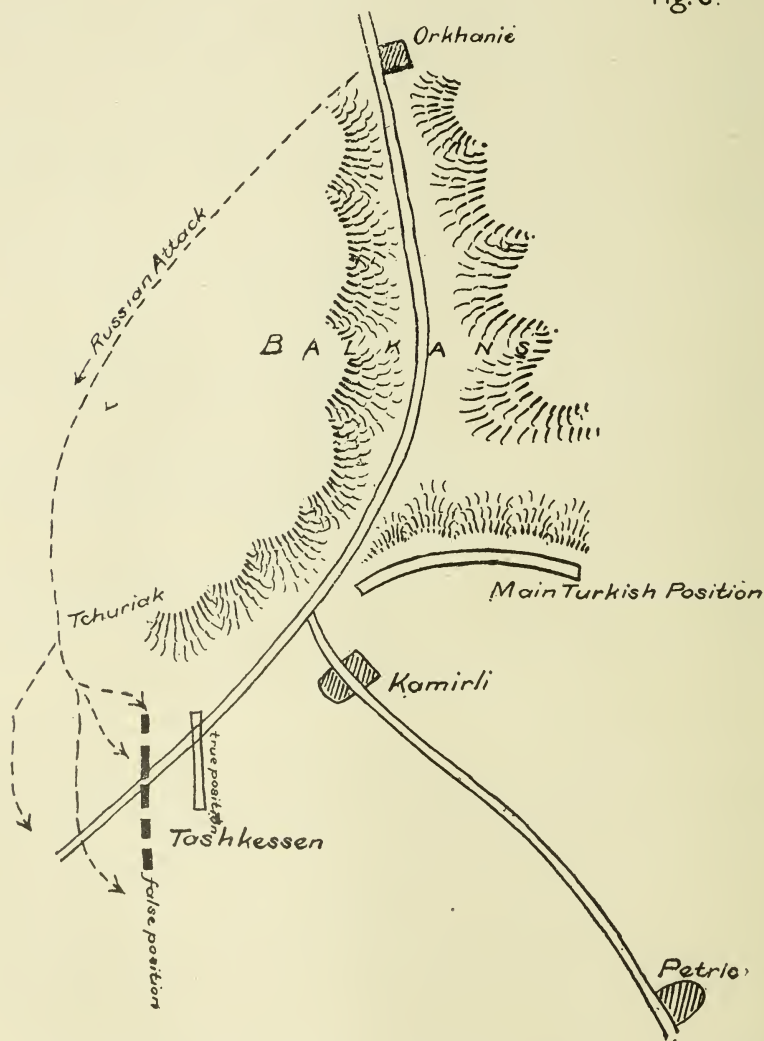
Shakir Pasha with a Turkish army corps was holding the pass through the Etropol Balkans served by the road from Orkhanie to Kamirli, at which latter position his force was entrenched. After the fall of Plevna, Gourko succeeded in turning this pass by utilizing the mountain paths by Tchuriak,



and debouching on the plain succeeded in threatening the retreat of Shakir on Petric.

To delay Gourko, General Baker with a small force of 3000 men and 5 guns took up a position at Tashkessen and forced an action, although his position could have been turned.

Fig. 6.



As it was only necessary to hold out till the evening of the 29th December, 1877, Baker occupied two positions, a false one in advance, and a real one a mile in rear separated by a valley.

To his great joy Gourko deployed nearly 40,000 men and 3 batteries to attack the false position, sending a division to each flank to thoroughly en-

velop it, and the hope then occurred to Baker that if these large forces arrived massed and disordered in the advanced position (really a screen) he might from the real one be able to repulse them, though the odds stood at  $12\frac{1}{2}$  to one. Baker's original plan was the defense of successive positions, but the one suggested by Gourko's premature attack was evidently better.

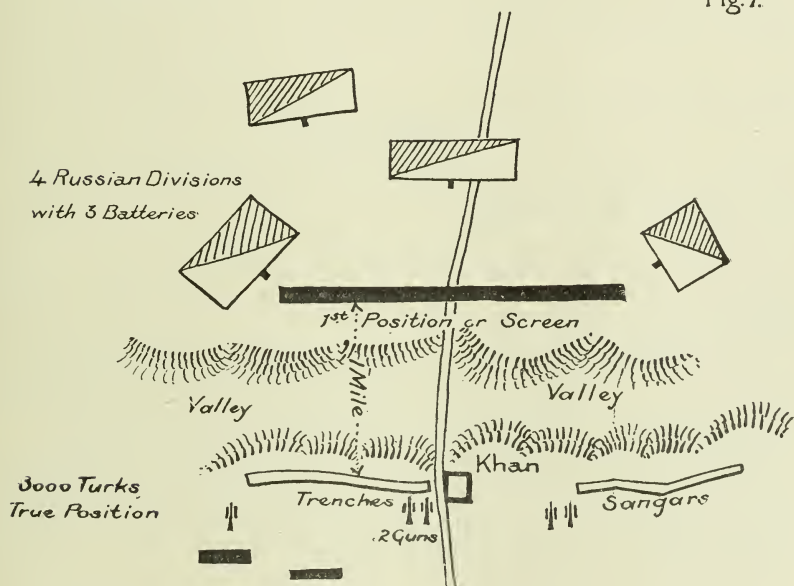
The attack began at daybreak, and by half-past 12 Baker had retired to the main position, which was entrenched, having  $4\frac{1}{2}$  hours of daylight to hold out, and the attacking force being clumped and difficult to extricate for even a fresh front attack, still less to form fresh flanking columns.

Baker's position was on both flanks of the road, commanding which was a strongly built "Khan" or Traveller's Serai, fit to resist field artillery and in which he placed 4 companies. See Fig. 7.

Close by in a yard he hid 2 mountain guns, which, being masked, acted subsequently with the force of a surprise. See Fig. 8.

Tashkessen

Fig. 7.



On his left his battalions were able to entrench and used the Turkish trench. This form had been found capable of withstanding both infantry and artillery fire and cannot easily be improved upon. A small shelf or berme, however, might be added near the crest, to rest the elbow on, give better cover to the man, and hold his loose cartridges. It is necessary to avoid allowing this trench to be made too deep as the men then sky all their cartridges.

On Baker's right the ground was too stony to trench, but he permitted the erection of stone walls which he knew would be harmful under artillery fire, sooner than lose all protection against bullets.

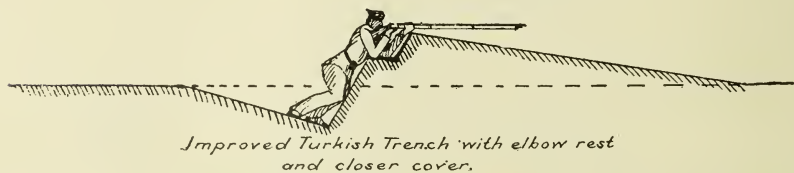
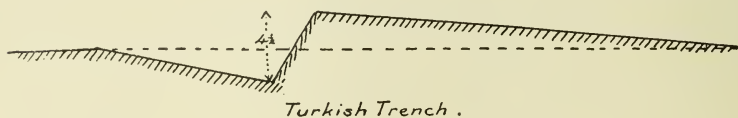
In the case this was a wise decision, but each case must stand by itself, and here a great portion of the Russian artillery was diverted to Kamirli.

The defense held out till nightfall, and after losing about half of its total force, had sufficient vitality to repulse a final charge of the Russian Guard with the bayonet after an action of 10 hours, which combined active manœuvring with a very trying passive defense.

Baker here employed cover, screen and illusion, and gave a further instance of the last before his retirement during the night.

The opposing sentries were only at 20 yards distance, and the Turks sub-

Fig 8



stituted dummy ones with perfect success and effected their junction with Shakir at Petric unmolested.

It turned out afterwards that Gourko had further been deluded by telegrams found in the office he seized into supposing that he had the main Turkish force in front of him, otherwise he could have easily retained Baker and spared a force to seize the Acha Kamirli defile and cut off Shakir.

Since the Russo-Turkish campaign, artillery has made enormous advances, and if at that time it was several times possible to compel the surrender of large bodies of men entrenched by shrapnel fire alone, the possibilities of its future action are hard to over estimate.

## CAVALRY ARMAMENT.

BY LIEUTENANT-COLONEL P. NEVILLE, 14TH BENGAL LANCERS.

(From *The Journal of the United Service Institution of India*.)

“Superiority of armament gives increased chances of victory in war. It does not of itself gain battles, but it is a decided element of success.”—JOMINI.

THE question of the best armament for cavalry is one which has for centuries occupied the attention of military authorities in all the great powers of Europe, and, strange to say, it is a question which does not seem even yet to be definitely and satisfactorily settled. The principal point at issue is, putting minor points aside, whether the lance or the sword is the better weapon, and, as a side issue, whether the front ranks should not be armed with the lance and the rear ranks with the sword. There seem to have been at various times epidemics, so to speak, of enthusiasm for one or the other arm. We see nations discarding the sword for the lance at one period of their history, and at another reverting to the sword and carbine.

Germany at present favors the lance, and in India, during the past quarter century, a number of native cavalry regiments have discarded their national tulwár for a lancer armament.

No living writer has gone more thoroughly into this subject, or brought a greater battery of erudition to bear upon it, than Lieutenant-Colonel Elliot, commanding the 3d Bengal Cavalry; and in this short paper (for I have no intention, even if I had the ability, of dealing exhaustively with so wide a subject) I shall make frequent quotations from his pamphlet published in 1890 and entitled “Notes on Cavalry Literature, treating more especially of its armament.”

Colonel Elliot’s conclusion is that the lance is the more suitable weapon for the shock, and the sword for the subsequent *mêlée*.

In this most cavalrymen will agree, but here we are but at the commencement of the problem, which really is, how the same man may be enabled to first attack with the lance and immediately afterwards employ the sword as his weapon. Going back to the middle ages we find the heavy-armored knights charging in line, armed with very long and heavy lances. They were followed at some 40 or 50 paces by a second line composed of their esquires and men-at-arms who carried swords. If the charge was successful, this second line, joining in the *mêlée*, helped to complete the victory; if, on the other hand, the knights suffered a reverse, they were enabled to rally and re-form behind this second line. It will be remarked also by the student of history that, after the first shock, the knights discarded the heavy lance and laid about them stoutly with mace, battle-axe, or sword.

Before considering the three-fold question—*i. e.*, lance in both ranks, sword in both ranks, or lance in front and sword in rear ranks—I will give some quotations from Colonel Elliot’s book to show the various opinions of recognized authorities on the subject; and by authorities I mean not



only writers who have devoted time and study to the subject, but also and more especially men who have been expert leaders of large bodies of cavalry in the field, and whose *dicta* are based on actual experience in war.

In 1811, Napoleon, by a decree dated the 11th November of that year, attached a regiment of lancers to each division of cuirassiers, thus recognizing the principle that the lance is useful in the front rank only.

In "Les Tendances actuelles de la Cavalerie Russe," by Sainte Chapelle, Paris, 1886, a full account of the recent transformation of the Russian cavalry is given, from which it appears that by a ministerial decision, dated April, 1883, the regiments of Don Cossacks have preserved the lance, but in the front rank only. The commission charged with the inquiry on this subject give the following reasons in support of their decision:—"If the horsemen of both ranks have the lance, the result in a charge will be as follows: At the moment of impact, either the front-rank man will strike his adversary and leave the lance in his body, or if he has missed, it will be because the latter has taken off the point of his weapon with his sword. In either case the lancer will find himself unharmed in the *mêlée*; and, *a fortiori*, the rear-rank man, who charges with his lance carried and disengaged from the boat, will be disarmed also; whilst if the front rank only have the lance, the rear-rank man, charging sword in hand, will be able to come up to the support of their front-rank men."

An article entitled "Les Transformations de la Cavalerie" in the *Revue de Cavalerie*, 1886, gives a full account of lancers and their suppression in the French and Austrian armies. The writer is an enthusiast for the lance. In 1870, towards the end of the Franco-Prussian War, the Colonel of the 5th Lancers telegraphed to Paris for permission to discard his lances and use rifles instead, on the ground that he could not perform properly outpost duties in front of the army. General de Laverdo, of the Ministry of War, telegraphed in reply—"Prenez modèle, pour éclairer l'armée, sur les Uhlans Prussiens, qui sont armés de lances."

Marmont favored the lance for the front rank only:—"Il faudrait en armer le premier rang de tous les regiments de ligne et de grosse cavalerie."

Latour-Maubourg, at the battle of Dresden, 27th August, 1813, made repeated attacks on the Austrian squares, but failed in them all until he placed fifty lancers of his personal escort in front of the cuirassiers. These lancers made a breach in several squares, through which the cuirassiers poured, and so broke the left wing of the Austrian army.

In an article, "Encore la Lance," in the *Revue de Cavalerie*, 1890, the writer says: "In Germany up to the present time there were only 25 regiments, out of a total of 93, armed with the lance. Under recent orders issued by the Emperor, there are now 35 equipped with the new armament, and 39 if the four regiments of heavy Saxon and Bavarian cavalry are also to receive the lance." Quoting Lieutenant-Colonel Elias, of the English army, he says: "Quoi qu'il en soit, l'opinion de ceux qui conseillent d'armer le premier rang de lances mérite d'être examinée. Pour nous, Anglais, qui avons si souvent à combattre contre des Afghans, des Arabes, et autres guerriers Asiatiques courageux, il est vrai, mais pourvus de mauvaises armes à feu la lance serait d'une grande utilité, car ces ennemis se couchent

à terre dans le mêlée it ils deviennent dangereux dans cette position où le cavalier ne peut les atteindre avec son sabre."

The truth of this was proved very decidedly in the Afghan campaign of 1879-80. The enemy threw themselves down when charged by cavalry and slashed up with their heavy knives as the cavalry passed over them, inflicting in numerous cases mortal wounds on our men. Swordsmen were unable to reach them with their sabres, but our lancers gave such a good account of the enemy that they quickly learned to dread the lance, which is undoubtedly the "Queen of weapons" when employed against infantry.

"So far as native horsemen are concerned," writes Colonel Elliot, "it is absolutely necessary to eradicate from their minds the feeling that they are 'incapable of it.' They know (few better) the difference between a sharp tulwâr and a blunt sword. They know from personal experience what the lance can do and what it cannot do. Some day these men may be called upon to face the fire of magazine rifles. To do this with any chance of success, they must feel and know that they have the best armament in the world, and not the second best only. Second best armament means second best troops, and as it costs no more to feed and pay the best than the second best troops, a wise policy would seem to be to consider these matters while it is day. \* \* \* Asiatics have in all ages and in all countries supplied their want of physical strength (as compared with Europeans) by the very simple process of never using edged weapons, such as swords, knives, daggers, scimitars, etc., unless they had a razor-like edge, and with which, from their natural construction, they can inflict terrible wounds. The Hindustani tulwâr, Mameluke sabre, Afghan knife, Malay creese, Ghoorka kukri, Turkish scimitar, Albanian yataghan, Persian sabre, Japanese sword, are all practical examples of the truth of the above statement. \* \* \* Nolan quotes many instances which tend to show that irregulars armed with sharp swords, and having a proper command over their horses, have over and over again severely punished English dragoons of far greater physical strength and moral courage than themselves."

The above goes to prove that if cavalry are to be armed with the sword, the sword must be sharp, and not the blunt steel bar which is in vogue in our army to-day. This is of little use except to parry, unless when placed in the hands of a second Samson, who, it may be remarked, might do as good execution with his traditional jaw-bone of an ass.

Wellington was of opinion that the rear rank at close order was of no use to the front rank:—"I think that the second rank of cavalry at the usual distance of close order does not increase its activity. The rear rank does not strengthen the front rank, as the centre and rear ranks do the front rank of infantry. The rear rank of the cavalry can augment the activity, or even the means of attack, of the front rank, only by a movement of disorder." This tends to prove that our present system of charging with the rear rank at close order is vicious and unsound. If this be true for hussars it is doubly so for lancers, for the rear-rank lancer, charging at full speed eight feet in rear of his front-rank man with his lance at the "carry" in the bucket, is not only practically helpless and useless at the moment of impact, but also he is a source of danger to his front-rank

man.\* Jomini, Marmont, Roche-Aymon, Okouneff, all are in favor of the lance in the front rank only. Saxe, Poniatowski, Latour-Maubourg, De-Brack, Roginat, Gouvion St. Cyr, Foy, Morand, Colbert, Pajol, and Napoleon recommend the use of the lance and sword in conjunction, each weapon in its proper place, the one supplementing and correcting the defects of the other.

Sir Charles Napier looked on native horsemen as men of the sword, and was of opinion that their own national tulwár was for them the best weapon. He was dead against "dragooning" the irregular cavalry of India. He did all he could to ridicule the idea that Asiatic horsemen could be expected to become the counterpart or duplicate copy of English dragoons, but, as he says, in his letters, without the least success.

The events of 1857 swept away in one day the regular native cavalry with their blunt swords, long stirrups, and slippery saddles, to be replaced by corps like those commanded by Probyn and Hodson, whose men, being left to choose their own horses, saddlery, weapons, etc., according to their native ideas of what was really suitable, very soon convinced all concerned before Delhi and Lucknow that the wisest policy is to recognize the fact that the irregular native horseman has one way of fighting:—and the European dragoon another.

These modes of fighting, utterly distinct, are well contrasted by Nolan.

"As Sir Charles Napier said, the European trooper's downright blow splits the skull; the native sowar has, as a rule, neither the strength nor the nerve for this style of warfare, so he, with cunning artifice, instead of brute force, arrives at the same object by a delicate drawing cut (from the wrist) across a limb, which in nine cases out of ten severs some artery or blood-vessel. The result is the same, though the weapons employed are quite different."

Sir Charles Napier, writing on the subject, says: "The slicing of the Eastern horseman's razor-like scimitar is terrible."

"The Book of the Sword," by Sir Richard Burton, 1884, is a masterpiece on the subject. Of curved or straight swords the author says: "The straight sword, used for thrusting, is hard to handle when the horse moves swiftly, and the broad straight blade loses its value by the length of the plane through which it has to travel. On the other hand, the bent blade collects, like the battle-axe, all the momentum at the 'half weak,' or centre of percussion, where the curve is greatest. Lastly, the drawing cut would be easier to the mounted man and would most injure his enemy."

"This dictum," says Colonel Elliot, "finally disposes of the popular fallacy that a straight sword is best for a mounted man. It is the best for a man on foot in the shape of a rapier, but introduce the horse into the question and the conditions are altered at once, as Burton clearly explains.

\* \* \* The tulwár, or half-curved sword of Hindustan, cuts as though it were four times as broad and only one-fourth of the thickness of the straight

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\* A British cavalry officer who has served many years with both hussars and lancers writes:—"I can assure you that when the 'charge' sounds for a real conflict, the rear-rank men bring their lances to the 'engage' also; not likely men are going into an enemy with their lances at the 'carry.' If they had swords it would do away with the above danger."

blade. But the 'drawing cut' has the additional advantage of deepening the wound and cutting into the bone. Hence men of inferior strength and stature used their blades in a manner that not a little astonished and disgusted our soldiers in the Sind and Sikh campaigns."

There can be little doubt that against infantry the lance is the best weapon for both ranks, but in cases where the sword, scimitar, or other cutting weapon is the national arm of the troops, it would seem a doubtful policy (at all events in the case of Asiatic troops expert in the use of the sword) to replace this by the lance, which is a weapon requiring great strength of arm to wield successfully, and, as we have seen, Asiatics have not the strength or nerve of Europeans in the fight.

That the sword may be victoriously employed against infantry is demonstrated by current events in Cuba, where the inhabitants are engaged in a fierce struggle for liberty against the Spaniards. In *The Illustrated American* of April 25, 1896, there is an interesting article on the "Machete," Cuba's favorite weapon:

"While military experts have been telling us for years that the new conditions of modern warfare have made the cavalry charges obsolete, we read nearly every day of Cuban victories won by cavalry wielding the 'terrible machete.' This machete (pronounced 'machetty') is the implement for all needs throughout Spanish America. This blade is first cousin to the sabre of our own cavalry, but while the sabre serves only for one purpose, the machete serves many, and is as useful in peace as in war. Almost every Spanish American above the age of childhood carries a machete. With this the laborer cuts his sugar-cane, prepares firewood, and trenches the ground for his crops. The horseman wears the machete because with this he cuts his way through the woodlands during journeys over rough country. It is sword, spade, and hedging bill, axe, hatchet, and pruning knife. You may have the machete in nearly thirty different forms. \* \* \* Two things have made cavalry conspicuous in the Cuban war, at a time when men had begun to think of the cavalry sabre as sure to take its place with the lance among the weapons of the past. First, every Cuban owns a machete and may own a horse. Given 50 Cubans with horse and machete, and you have for purposes of this war an effective troop of cavalry. Again, nearly every engagement of the war has been fought on rough ground where the infantry hollow square could not be effectively formed.

"Cavalry can rarely penetrate the square of infantry, bristling with bayonets and ready to pour volley after volley into an advancing foe. But, on the other hand, infantry, formed as troops must be upon the rough Cuban battle-fields, cannot easily withstand the charge of cavalry armed with the terrible machete."

A glance at the present state of affairs in Cuba will show how much the insurgents have effected, principally by their cavalry. The rebel army numbers about 40,000 men, who have only a limited amount of ammunition obtained chiefly from abroad. The Spanish army consists of 135,000 regular troops of all arms and 40,000 volunteers drawn from Spanish residents of the island. And yet at the present moment the Spaniards are acting purely on the defensive. Most of their troops are locked up in garrisons



along a line of 22 miles extending from the outskirts of Havana to the southern coast in the vicinity of Mariel. In the meanwhile the rebel chief Antonio Maceo remains quietly in Pinar del Rio awaiting further supplies of ammunition from the United States before again assuming the offensive.

Given, then, for the sake of argument, that the lance is the best arm for cavalry when opposed to infantry, it would follow that divisional cavalry should have the lance in both ranks; and as for attack formation, several lines in single rank would seem to be the best adapted for the purpose. For the independent cavalry division acting at a distance ahead of the army against the enemy's cavalry, the consensus of opinion is in favor of one armament of about equal lances and swords, but the question still is most how best they may be distributed.

Shall we have brigades consisting of one lancer and one hussar or dragoon regiment, the whole acting in single rank? The Duke of Wellington was a great advocate for the rank-entire system, and so have been many other distinguished soldiers. If we adopt such an organization, the lancers must form the attacking line, and the hussars, riding some 50 paces in rear, must take the place of the present rear rank. The drawback to this arrangement is obvious. The two ranks belonging to different regiments and having different commanders, would no longer be homogeneous; there would be no unity of command. It might succeed for an attacking, or first-line brigade, riding straight to its front; but for the supports and reserve, where sudden formations for offense or defense must be rapidly assumed, or where units have to be thrown into the fight at various points, unforeseen, the multiplicity of commands and the difficulty of manœuvre combine to condemn such an organization.

Shall we adopt the system of lances in the front rank and swords in the rear? This at first sight would seem to be a solution of the difficulty. It most closely resembles the tactics of the middle ages. The front rank might, after charging, if the *mêlée* were too crowded to give them free scope for their weapons, copy the knights of old, and, discarding the lance, draw their swords. If they were victorious there would in all probability be ample opportunity for recovering their lances after the fight. This system, however, presents the difficulty that in every home charge a certain number of lances are always broken or lost. This has been estimated at about 12 per cent., so that after about eight charges—not too many for a regiment to expect in, say, a week's campaign—there would be no lances left. It might be possible in some theatres of war for the divisional train to bring up large reserve supplies of lances, but again, in very many other situations, and certainly on our Indian frontier, this would be impossible, and each regiment would have to depend on such arms only as they were able to carry for themselves.

It would seem to be imperative, therefore, for every man to carry a lance in lancer regiments. How, then, should we meet the requirements of the recognized proposition that the lance is the best weapon for the shock and the sword for the *mêlée*?

The first solution that suggests itself is that the rear-rank men should sling lances on their left arms and use the sword. This is but a make-shift

at best, and has the disadvantage that the horseman is hampered in the management of his horse by the lance hanging on his bridle arm ; moreover, if in the *mêlée* a lance, thus slung, comes out of the bucket, the rider will be very heavily handicapped, as his horse is liable to become quite unmanageable on account of the lance getting mixed up in his hind legs.

The next solution is that while on the line of march each man carries a lance, on turning out for parade the rear-rank men leave their lances in camp and parade with swords.

In this case, after each engagement the loss of lances before alluded to would tend to swell the rear rank of swordsmen and deplete the front rank of lancers. A proposal has been put forward of late to have a jointed lance made in three pieces which the rear ranks could carry strapped across their backs. This scheme certainly merits a careful examination, as if a strong joint quickly adjustable were devised the idea has great possibilities of usefulness, and the lance thus strapped across the shoulders, as the carbine is sometimes worn, would prove a shield against sword-cuts, whilst inconveniencing the rider as little as might be. Until such a lance has been approved of, perhaps the simplest plan would be for every lancer on service to carry his lance as above on the march, but, on mustering for parade, the rear rank to leave their lances in camp, with the exception of four men per field troop, who should carry the lance on their left arms. This would allow a reserve of 16 lances per squadron to replace casualties.

If this suggestion be adopted, the front and rear ranks should be equalized, and not as at present ; moreover, it is essential that some regulation for the manœuvre of the rear rank during the charge should be promulgated. The least distance between front and rear ranks should not be less than eight horses' lengths, and this might with advantage be increased to 25 or 30 yards.

Finally, if we would utilize fully the principle of lance and sword combined, each supplementing and correcting the faults of the other, as recommended by Napoleon, we must teach our troops the proper use of these weapons.

The mere putting men through the lance and sword exercises until they can perform them without a mistake, is not sufficient. European troopers armed with a cut-and-thrust sword must be taught to fence, and native horsemen armed with their national *tulwâr* must be taught to cut. No sword exercise will teach this ; nothing but actual practice in cutting with a true edge on foot and on horseback. The drawing cut requires practice, which alone insures perfection. No exercise except actual cutting will suffice to teach the use of the sword. If sheep and other animals are too expensive, a very good substitute will be found in a bundle of sugar-cane which may be procured in most localities in India.

So far we have considered the best armament for divisional cavalry, whose objective will be, in all probability, the enemy's infantry. We have also seen that, taking the consensus of opinion of recognized authorities on the subject, lancer regiments should carry, every man, a lance, but that when parading on service, the rear ranks, with the exceptions noted, should leave their lances in camp or with their baggage guard in rear. It now re-

mains to be considered how best to distribute in the independent cavalry division the regiments armed with swords. Taking, as a general principle, that lancer regiments and those armed with the sword, be they dragoons or hussars, should be of equal strength, we should have in a division of nine regiments—*i. e.*, three brigades of three regiments each—either five regiments of lancers and four of swordsmen, or five of swordsmen and four of lancers.

In the first case, let us see how the lances and swords ought to be distributed. The lance has been proved to be the weapon best suited for the shock of attack: therefore, beyond doubt, our first or attacking line should be lancers. Assuming for the purposes of the present consideration that a brigade of three regiments is a suitable force for the attacking line, we have, in the first line, three regiments of lancers. The second line, or supports, may be disposed either on one flank (the exposed flank, if there is one) or on both flanks; and as this is also an attacking line, intended to deal with the second line of the enemy, these regiments should also be lancers (two regiments). There remain the reserve and the “surprise squadrons.”\* These squadrons have not to attack in the first instance, but to fall on the rear of the enemy after the shock; they should therefore be swordsmen, and not lancers. If we distribute three squadrons to the first line, or attacking brigade, and one to the supports, (Plate 1, Fig. 1) we shall have remaining three regiments armed with the sword for the reserve. That the reserve should be composed of swordsmen is indicated by considerations on the proper use of the reserve, for which there is no place in this paper. In my opinion the reserve is a body of troops at the disposal of the general officer commanding, from which successive units—be they squadrons, wings, or regiments—are to be thrown into the fight as it develops. It follows that their services will not be called upon until the *mêlée* stage is reached, when, as we have seen, the sword is the better weapon.

Should one division, however, be outnumbered, and should five regiments in the first line and supports not be equal to cope with the enemy's array, then a whole regiment, or even more, may have to be detached from the reserve previous to the *mêlée* stage, but these should be kept well back in echelon on the exposed flank, and not pushed up into the fighting line.

In the second case of four regiments of lancers and five of swordsmen, the attacking line would still be composed of three regiments of lancers, the supports of one regiment of either arm, and the reserve as before. (Plate 1, Fig. 2.)

Where the division is composed of six regiments—*i. e.*, three brigades of two regiments each (Plate 2)—the attacking line would still seem to be best constituted if the three lancer regiments be placed therein.

The remainder would be armed with the sword and would most probably be disposed—two regiments as supports, and one in reserve.†

\* These squadrons will in future replace the useless “succor squadrons.” Their mission is to fall on the enemy's rear immediately after the shock, each field troop acting independently under its own leader.

† In the case of so small a division acting alone, the surprise squadrons must be dispensed with.

Plate.1.

Fig. 1

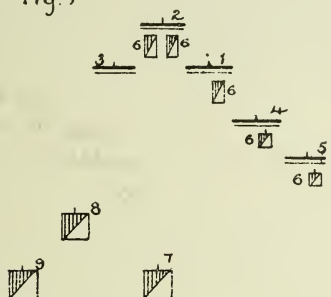
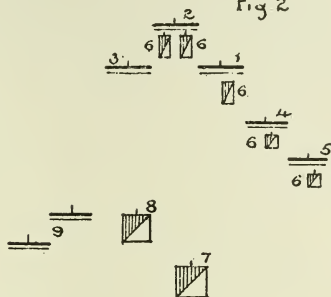




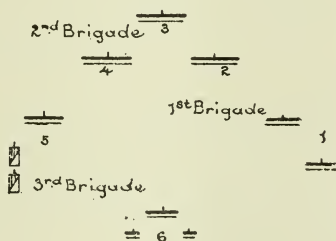
Fig 2



Reference  
 Lancers   
 Hussars 

Showing the distribution of swords  
 and lances in a nine-regiment  
 Division

Plate.2.



Showing the distribution of swords  
 and lances in a six-regiment  
 Division



That this distribution of the cavalry division into three lines is not by any means obligatory, must be clearly understood. There are no fixed rules that arbitrarily govern the employment of cavalry against their own arm. There is no reason, under certain circumstances, why the whole division should not attack in a single or double echelon of regiments, or even wings—the general principle being observed of putting the lances forward in the fight and keeping the swords, as far as may be, for the *mêlée*.

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## MODERN COAST DEFENSE TACTICS.

BY CAPTAIN J. STANLEY, VICTORIAN PERMANENT ARTILLERY.

(*From the Journal of the United Service Institution of Victoria.*)

### GENERAL PRINCIPLES.

IN dealing with the question of Coast Defense, the drill-book plainly states that it only purports to lay down such general principles for artillery organization and fire control as may serve as a guide for the preparation locally of a detailed scheme for the artillery defense. Such local scheme for each individual work would be the outcome of many carefully thought out experiments, conducted by competent and highly-trained artillery officers, armed with a complete knowledge of local conditions.

This plan, when finally adopted, would be duly and frequently rehearsed, with a view to its possible improvement or correction, and also to familiarize all concerned with its details.

The scheme of defense for each special unit having been formulated, and all details connected therewith entered in the permanent record of the work concerned, the artillery commander would devise a scheme for the complete unification of his command, so that the chain of fortresses or guns would work together harmoniously, to each other's mutual assistance, protection and support.

The attendant difficulties connected with the preparation of a plan for the organization of an extensive "fire command" are manifold, and, to some degree, perplexing. Many conditions—some conflicting—require to be fulfilled and reconciled. The situation demands a master mind to arrange the details and to make provision for all the possible contingencies attached to so great a responsibility.

On this point the drill-book sounds an emphatic note of warning. It says: "It cannot, however, be too strongly urged that even the best organization, unless constantly practised, will not only fail of its object in time of war, but be worse than useless, as limiting to an injurious extent the responsibility and initiative of subordinate officers."

It would almost appear from the foregoing that an improperly-prepared or unfinished plan would be preferable to the highest form of organization if incompletely rehearsed. This is not, however, what is meant (as I take

it). What the drill-book aims to demonstrate is the imperative necessity for the establishment and maintenance of a high standard of wholesale efficiency, such as can only be attained by continuous practice and rehearsal. Efficiency so absolute and complete should enable every one concerned to act coolly and promptly in any emergency, and without the possibility of any blunder from ignorance or surprise.

It is only within the last seven years or so that the tactics of coast defense have assumed any definite shape. Previously it would appear that coastal fortresses were supposed to be fought on somewhat easy-going lines, and the garrison artillery service was held in comparatively poor regard. Now the general principles which govern coast defense tactics are plainly laid down, clearly taught, and intelligently practised, and the G. A. is an arm from which, at present, much is expected.

The vast progress which has been made in coast artillery work during the past few years has been chiefly due to the introduction into the G. A. services of electricity, hydraulics, steam, and, perhaps, most of all to the application of highly perfected scientific instruments. These forces and powers have gradually revolutionized the coast gunner's work.

Colonel Jocelyn, R. A., in his lecture on "Coast Artillery in Action," says: "From the introduction of electric communication dates the *renaissance* of the G. A."

Steam and hydraulics interest us very little as gunners here, but with regard to electricity in its application to communication, and as a means of firing guns, I propose later on to refer to a few of the points with which I dealt in my lecture on "Position firing," delivered to the artillery section of this institution recently.

#### CHAIN OF COMMAND.

I would now direct your attention to the newly laid down "chain of command," as set forth in Army Order No. 2 of 1896.

The general chain of command in a fortress and its connection with the artillery chain of command:

1. Every fortress will be under the command of a "fortress commander," and be divided into "sections," each under a "section commander," who will be responsible generally for his section of defense.

- 2 (I.) Each section command will include the portion of the garrison allotted for its defense, and the fire commands within its area.

- (II.) The boundaries of section commands will be so traced as to include entire fire commands. A fire command must never be partly in one section and partly in another, except to the extent provided for in (3).

- (III.) All personnel and matériel will follow the guns, *i. e.*, officers, men, and instruments will belong to the fire command in which their guns are situated, even when their stations are topographically in another section or fire command.

3. The general chain of command and the communications will invariably run from the "fortress commander" through "section commanders" to "fire commanders," with which latter officers the chain of artillery command will commence.

4. The fire command will be the highest unit of executive artillery command.

The fire commander will be under the immediate orders of and be in communication with the "section commander."

The chain of artillery command will invariably run from the "fire commander," through the "battery commanders," to the "gun-group commanders."

5. The general or other officer commanding the Royal Artillery will be employed on the staff of the "fortress commander." In some few cases the paucity of officers may render it necessary for the officer commanding to act as a "section" or "fire" commander; but such cases must be exceptional, and exceptionally treated.

#### ORGANIZATION BY FIRE COMMANDER.

The foregoing order clearly prescribes that the fire commander will be the highest unit of executive artillery command. Let us glance briefly at the primary duties and responsibilities of this officer—the fire commander. It is laid down that the sizes of a fire command will be governed by the character of the water area to be defended, and by the number of the forts and batteries which it may be possible for an officer to direct in action. Local conditions must, therefore, clearly define the limits of a fire command. One fire commander might be weighted down with the obligations attendant upon the control of a chain of important forts, whilst another would find his responsibilities limited to the command of a single work. In either case, whether great or small, the onus of responsibility of the organization and preparation would be on the shoulders of this officer.

One of the F. C.'s first considerations would be the selection of his fighting station. This should be in such a position as to insure him the most extensive possible view over the fire area and the sea area beyond it. With a line of defenses of considerable depth, but with narrow fronts, his position would, as a rule, be a well-advanced one, but with defenses having an extended frontage his position would probably be a central one.

Armored protection would be costly, and at the best ineffective against heavy projectiles and high explosives.

Fighting stations then would have to depend on their small size and on concealment. They should therefore be made to assimilate as much as possible to the surrounding country. The exact manner in which they should be disguised is obviously a matter for local decision.

The next consideration would be the efficient training of the specialists. These would include D. R. F. and P. F. specialists, specialists for electrical communication, artificers, master gunner's staff, etc. A careful selection would require to be made in the first instance, and the men chosen then properly instructed in regard to their respective duties.

Attention would now be devoted to the distribution of the fighting force available under the B. C. to the different classes of ordnance in the fortresses. In order to make clear the F. C.'s organization work, a few definitions may be of use.

A "coast fortress" is defined as an area of land and sea, provided at

certain points with an artillery armament, partly "fixed," partly "movable," and its area is the extent of land and water which can be covered by the fire of its guns; the water area is the part with which we are concerned.

The fixed "armament" consists of such guns as are mounted on garrison mountings in permanent positions of whatever nature. It is divided into two classes, the "primary" and the "secondary" armament.

The "primary armament" consists of R. M. L. guns of 7 inches and upwards, and of B. L. guns of 6 inches and upwards.

These guns fire armor-piercing projectiles, and would be used to attack the armored portions of vessels as well as the unprotected parts. The "secondary armament" consists of the lighter natures of R. M. L. and B. L. guns, and quick-firing guns on garrison mountings, whose function would be to keep up a rapid shell fire on the unarmored portions or the ports of an enemy's vessels, and to repel boat attacks or attempts to land troops, and in some cases to assist in the protection of mine-fields. The "movable armament" consists of siege guns and howitzers, field, machine and quick-firing guns, on travelling carriages. They would be employed sometimes in prepared emplacements inside the forts to intensify the shell fire of the secondary armament, and generally to assist in the various tasks mentioned above; more usually they would be placed outside the fort in selected positions.

With regard to the matter of "primary" and "secondary" armament, there is little to discuss within the scope of this lecture. Our guns and mountings, though many of them are of premature birth—that is, of dates anterior to the Mark I. Service ordnance—are good and serviceable in most respects.

Defects of design and many minor manufacturing defects, such as are inseparable from untried departures in gun and mounting making, have been discovered.

Some have been rectified locally, under our own I. O. M., and weaknesses of a more serious nature have been and are being remedied in England. The existing armament at P. P. Heads, however, seems sufficient for all present possible requirements, and it will, I presume, be augmented as guns under alteration are completed.

With reference to the "secondary" armament, I should like to see a few Q.-F. guns, mounted on light transporting carriages, which would enable them to be rapidly conveyed from one flank of a fort to another where their presence would be more useful. Spare field-guns would doubtless be utilized as part of the "secondary" armament in time of war. Siege guns and howitzers for high-angle fire would be a very useful addition to the secondary armaments of some of our forts.

For the good order and serviceableness of the armament the F. C. is responsible, as also for the ammunition supply and its details, and the means of supplying proper accommodation, water, food, and fuel for the garrison.

It would be his duty to satisfy himself that the battery commanders understand the working of their own forts, and the mode of fighting them under his control, under all probable conditions, and that suitable plans have been made and recorded for defense against every form of attack.



Some general ideas would be formed regarding the most probable direction an assault upon any particular work or chain of works would assume. The question—purely a local one—would govern the relative importance of the different classes of ordnance in a fortress, and consequently influence the disposition of the personnel.

Each separate work might probably require special consideration in this respect, having regard to the particular function it would be required to fulfill in connection with the general scheme. Take, for example, a possible form of attack, which I think would not be an entirely improbable one here in the event of Great Britain having lost temporary or partial command of the sea in these waters. A bombardment from a few swift armored ships, commencing at long ranges, having for its object the silencing of the forts or diverting the attention of the defenses, to enable fast cruisers or small vessels to run past, with a view of destroying shipping or rendering useless the mine-fields. In this case the F. C. would require to determine, with reference to every link in the chain of his command, the importance of his heavy, medium, and lighter B. L. and R. M. L. guns, his Q.-F. ordnance, and secondary armaments at the various stages of an engagement, and make his preparations and dispositions beforehand—no light task.

To obtain the best possible results, however, the main principle to be observed is that the most intense fire should be directed, at every phase of an engagement, at that part of the attacking force whose action, if successful, would most imperil the defense. It is a generally accepted axiom that guns alone cannot be depended upon to stop ships "running past."

From this standpoint I may say, parenthetically, that the South Channel line of defenses, for instance, would provide ample food for thought for the artillery and engineer commanders in the preparation of plans, allotments of work, and distribution of personnel for attack and defense. In this section of our defenses Q.-F. guns would, of necessity, play a most important part, if, indeed, the armament should not consist of Q.-F. ordnance only.

#### Q.-F. GUNS.

As having a distinct and most important bearing upon the F. C.'s duties of organization, I feel compelled to dwell shortly upon the requirements of the most essential portion of fortress armament. The term "quick-firing" as applied to guns firing black powder is a dangerous misnomer. The rate of fire depends not only on the mere rapidity of loading, but upon the rapidity of laying, and the presence of smoke may interfere so much with the latter that the rate of fire may be reduced to that obtainable from a gun of ordinary type, or even below it, and the chief value of the Q.-F. guns may be lost.

Smoke also militates against the employment of the Q.-F. guns in groups. The imperial navy are receiving nothing but smokeless ammunition, and it is now issued, I believe, to the L. S. at home. In any case the "cordite" is in store, and can be quickly supplied in war time. In my opinion, it would be an enormous advantage, from many stand-points, if a Q.-F. section of specially selected, smart, intelligent, N. C. O.'s and gunners were

formed in each G. A. Militia Battery. It would afford a welcome relief from the ordinary heavy work of the garrison artillery, and should tend to generally smarten the batteries. It would act as an encouragement for the ambitious layers and gunners to qualify for this *corps d'elite*.

Even if in the F. C.'s scheme of defense the Q.-F. guns should be allotted to the permanent artillery, it must be remembered that at least two reliefs would be required to fight the guns, and "understudies" are necessary in every line of life's work.

One of the most essential requirements of Q.-F. guns is that the trajectory should be flat, for in using this class of ordnance at critical moments, and especially at night, to correctly give the constant and rapid alterations of range to the tangent scale, the flatter the trajectory the more chance is there of hitting an object even though the tangent scale may not be set to the exact range. It must be remembered that our 4.7 guns have only a muzzle velocity of 1786 f.s., whilst the later Armstrongs, even up to 1893, had an initial velocity of 2500 f.s., and the six-inch Q.-F. of the same date had an initial velocity of 3711 f.s.

Having dealt with the prominent features of the organization of a fire command, I will assume that the commander has perfected his plans, and proceed to the next stage, viz., the writing-up of that valuable volume the "Fort Record Book."

By running through the headings of the archives of a fort, some idea may be formed of the thoroughness with which all data connected with the work has to be compiled, in order that no contingency may occur with which a new commander might not be enabled to grapple more or less successfully, by means of the information furnished by his predecessor, and supplemented by that which he has himself acquired.

My special reason in directing your attention to these records, is that if you will allow your imagination to dwell for a moment upon the details required, you can not only readily conjure to yourselves a picture of what an ideal fortress would be like, but you would also realize what manner of work every coastal fortress in the Queen's dominions should be at this moment.

The "Fort Record Book," then, should contain detailed information in regard to the following points:

#### FORT RECORD BOOK.

It is of the utmost importance that in every fort a permanent record should be kept of all details of the fort, its general object, history, and armament, as well as all details connected with its organization both in peace and war, which should be in accordance with the provisions of the defense scheme.

It is the duty of the officer in charge of forts to keep up all details of the above nature in the Fort Record Book, Army Book 127, so complete that an officer on taking charge will find all information he can require ready to hand, and in the fullest detail. It must be clearly indexed, kept as confidential, and produced at the general officer's inspection. The book should contain copies of the plan of the fort, and the fort and group charts.

It must also contain details of all the information referred to in the

"Manual for Garrison Artillery," Vol. I., so far as his fort is concerned, so that if tables are lost, or figures in the gun emplacements or range-finding stations are erased, they can be immediately restored, also details on the following points:

Information under the following headings to be recorded:

1. General description and object of the work and its relation to other works in the same scheme of defense.
2. Details of construction, such as thickness of cover or walls of magazines and ammunition stores, material and thickness of shields, nature of parapets.
3. A concise account of all the changes that may occur in the construction or armament of the work.
4. Height and set of tide.
5. Depth of channels.
6. Landing places.
7. Facilities for landing men or stores. Local features generally.
8. Barrack accommodation, camping grounds—for garrison on mobilization—plan of the camp showing distribution of men.
9. Water supply—Orders *re* use of, for cooking, etc.
10. Emplacements.
11. Positions for electric lights.
12. Position for Q.-F. and machine guns or armament for general defense on land or sea front.
13. Detail of the ordnance in the fort.
14. How mounted.
15. How grouped.
16. Range- and position-finding arrangements.
17. Communication.—Full information as to communication, illustrated by drawings, both as connecting the battery commander with the fire commander and with his own subordinate officers and electric lights, and also as to the nature, extent, and purpose of all telegraphic or other communications.
- Provision for alternative means of communication where a breakdown may take place.
18. Fighting the fort.—A detailed account of the manner of fighting the fort under various conditions of attack (land or sea front).
19. Ammunition.—Actual contents and capacity of cartridge and shell stores and magazine and ammunition stores to be referred to on the plan. Establishment of ammunition for all guns and S. A. A.
20. Mine-fields.—Position and nature of mine-fields, with elevation and training of guns that can sweep them.
21. Transport and labor—Nature of, and where it can be procured on requisition.
22. Mobilization—Orders for.
23. Hospital accommodation, including the temporary treatment and removal of wounded.
24. Transport and labor available.
25. Preparations for defense.

Names of corps destined to form the garrison of the fort on mobilization, the approximate number of officers and men to be expected, and a general statement of their distribution and duties.

Reliefs and reserves of men and matériel, also a statement of the preparations to be made when war is imminent. These would include the construction of additional traverses, shelters, and blindages, the formation of ammunition depots, if not already done, construction of wire entanglements, strengthening of parapets, and generally the performance of such work as shall tend to increase the strength of the fort, and to render its capture by assault or surprise more difficult.

26. Numbers and general disposition of the field force coöperating in the defense.

27. Prominent objects.—The range and training of the various guns and groups to prominent objects, and, in the case of a narrow channel, to the mid-channel line on various trainings.

28. Tables, charts and plans—copies of the following:—Range tables, full and reduced charges; difference tables, from the various command posts; battery commander's charts; gun group commander's charts; correction tables for range; correction tables for deflection; quadrant table and permissible errors for full and reduced charges; arcs of fire of all guns; Admiralty chart of entrance to Port Philip; heights of guns from axis to mean tide level. Copy of all information regarding D. R. F. pedestals. Copy of the plan of the fort. Copy of manning table, the number for each post to be shown. Plan showing the position of the guns, ammunition stores, magazines, lifts, hatches, G. A. stores, range-finding stations; also how the guns are grouped, and what ammunition lifts supply them with ammunition, places of parade for manning details. The plan should be made out on as large a scale as convenient, the guns and ammunition stores being shown on the plan by their letter or number.

29. Fire orders.

30. Tide signals.

31. Posts and duties of district gunners.

32. Specialists.—Names, posts, and duties. The above includes P. F. and D. R. F. operators, telephonists, signallers, and electric light operators.

33. Codes, fire messages, trumpet and bugle sounds, signals.

34. Examination anchorages. Floating defenses.

A part of the book will be devoted as a journal, in which will be recorded, as they occur, all transactions permanently affecting each work or likely to be historically or technically of use or interest to future commanding officers. This book will be kept carefully up to date by the officer in charge himself, be under lock and key in a box permanently fixed in such a building or part of the fort as he may consider the safest and most suitable. It will be open to the use of the officers of the V. P. E. in charge of the district in which the fort is situated.

Officers in charge will make themselves master of the contents of this book, and will be responsible for its safe custody, and they should point out to the commanding officer, for reference to higher authority, any points



that cannot be carried out, or that are capable of improvement, but they must not alter it without permission.

(Note from G. A. Drill Book, 1895, not circulated at date of lecture.)

#### ATTACK AND PENETRATION OF ARMOR.

The attack and penetration of armor is such a wide subject, and the service rules and directions are so complete that I will only attempt to set forth a few general principles which should serve as a guide.

I cannot do better than quote briefly Major Hansard, R. A., on this subject.

#### FIRE TACTICS,—ROUGH RULES AS A GUIDE FOR FIRE COMMANDERS IN THE ATTACK OF SHIPS.

1. Fire should be opened at as long a range as possible with common shell and percussion fuse, unless the armored deck is well within the power of the gun at that range.

2. When the range has decreased to the point at which penetration of the armored deck may be reasonably expected, use armor-piercing projectiles until further decrease of the range causes the angle of descent to fall below 10 degrees. If no penetration can be expected, use percussion common at the deck till this angle of descent is reached.

3. When the armored deck can no longer be attacked (by direct fire), use percussion common at the unarmored portions of the vessel. A part of the secondary armament, or one or two groups of heavy guns where there is no secondary armament, should employ percussion shrapnel at the upper deck and at the secondary battery (percussion or plugged).

4. When the range is further decreased to the point at which the guns are certainly more than a match for the vertical armor of the ship (taking into account the inclination of her course to the line of fire), and at which (taking into account the size of the armored target) there is reasonable hope of hitting it, use armor-piercing projectiles at that armor, for preference choosing the belt to fire at.

5. The attack of the unarmored parts of the vessel by percussion common and plugged shrapnel should be continued simultaneously with the attack of the armor, the latter task being allotted to a portion only of the heavy armament. Common may be used plugged when the range is such that there is little likelihood of missing the side of a ship.

6. Quick-firing and machine- and field-guns should be employed to keep down the fire of the auxiliary armament in the tops and on the upper deck; and at close ranges to fire at the ports, and, where the height of site admits, into the barbettes.

7. At close ranges, time shrapnel should be used to clear the decks and prevent the working of guns in barbettes and stationary vessels.

8. Against cruisers having completely armored hulls, or other lightly armored vessels, attack as above, except that, when the range is such that penetration of the armor by common shell may be expected, use that projectile, plugged, against the armor.

The same general rules govern the choice of projectiles for high-angle fire as for direct-fire guns. A given number of shots penetrating soft armor

will probably do an equal amount of damage, whether they strike successively or simultaneously.

The damage done to a ship protected by hard armor by a given number of shots will probably be much greater if they strike the armor simultaneously than if they strike in succession. The simultaneous explosion of several heavy shell between decks may be expected to produce more disastrous effects than would be caused by the same number exploding singly. The "racking" effect on the ship generally will certainly be greater if the projectiles strike at the same instant.

For these reasons guns are, in almost all cases, fired by salvoes, the only exceptions being when ships are lying off at long range, and when, at the commencement of the action, a few trial shots are fired to obtain the necessary corrections. The groups may either fire independently, independent group salvo fire, or in succession. The former gives the greatest volume of fire in a given time, and slowness of loading by one group will not delay the others; as a general rule, it would be used when laying by quadrant elevation and training arc, while battery group fire, commencing with the leeward group, would be resorted to when using sights, to avoid interruption of the laying of one group by the smoke of another. As regards the rate of fire, this would naturally be slow and deliberate at the longest ranges, increasing in rapidity as the range decreases, and the projectiles have more effect; while against ships forcing a passage past forts, the fire as they approach the part of the channel where they will be at shortest range, should be as rapid as possible consistent with accuracy.

#### FIRE CONTROL.

To enable our shots to hit the target there are three methods in use.

1. With no instrument to find the range of bracketing.
2. D. R. F.
3. P. F.

With the two first all gunners are familiar. The position-finding system being now generally adopted in all important fortifications in the empire, deserves a few words of description, which should not be out of place. The position-finder is merely an instrument for finding the position of an object. Position finding is a system by which guns can be effectively laid and fired without the men at the guns viewing the object fired at. It consists of many other appliances besides the P. F. proper. A position-finding system consists of:

(a) An instrument by which the range and bearing of an object is automatically obtained.

(b) The means by which the ranges obtained at a distant observing station are turned automatically into ranges for the gun.

(c) The means by which, not only are the ranges from the gun obtained, but also the true bearing of the object from the gun is found.

(d) The means by which the position of a vessel some time in advance is predicted.

(e) The means by which these true ranges and trainings are communicated instantaneously and automatically at the guns.

(*f*) The means by which this information is utilized at the guns, or, in other words, the method of laying the guns.

(*g*) The method of firing the gun or guns.

(*h*) The arrangement of the guns into groups.

Now, before going further, it will be as well to define the difference between a range- and a position-finder.

A range-finder is an instrument which only gives the distance from itself to the object sighted.

A position-finder is one that marks on a plan the exact position of the object, and is thus capable of giving the range from any other point marked on the plan.

(*a*) Method of obtaining the range. There are two systems by which the range has been determined for position-finding purposes.

(1) One utilizing the height of the observer above the sea level (vertical base).

(2) Using a measured horizontal base, from the ends of which cross bearings can be obtained.

The first is the simplest, inasmuch as it only requires one observer, but it has the disadvantage of being very small compared with the distances to be observed, and therefore requiring great precision in the instruments. Recent trials have, however, shown that fair accuracy can be obtained at such heights as 23 feet.

All gunners are acquainted with the service depression range-finder, designed about 16 years ago. Without entering into details, I may point out that the range is obtained by simply directing the cross wires of the telescope on to the object by means of the drum; the graduations give the range in yards, the slider having previously been put to the height of the battery—the mathematical principle being the familiar one of observing.

The angle (*a*) due to the range *R* from height *h*.

The distance of an object on the sea-level can always be ascertained, from an elevated battery, by means of the angle of depression or the angle subtended by the object and the real horizon.

In the position-finder the range is obtained in a different manner.

Let *a*, *b*, represent the height of the battery, *b*, *c*, the range. (I am aware that this is not the theoretical range, but it is sufficiently good for all practical ranges.) Now, if we draw *a d* parallel to *b c*, the level of the water, and set up *d e*, some proportion of *a b* (that is, representing *a b* on some definite scale), it is evident from the principle of similar triangles that *d a* will represent, on the scale, the range *b c*.

This is what is done in the instrument. The axis is set up to represent the height of the instrument above the sea; slide the upright till the cross wires of the telescope cut the water line of the object representing the line *e c*. The distance, then, of this upright from the axis represents *d a*, the range. This is engraved on the bar, and can be read off at any time.

## (2) HORIZONTAL SYSTEM.

The mathematical principle on which this is based is that of similar triangles.

When following a moving object, of course, these similar triangles must be constantly remade.

The mechanical principle of the position-finding system may be described as that of plotting the position of the target by the horizontal and vertical motions of a depression range-firing telescope. This telescope is attached to a metal arm pivoted over the point on the chart representing the actual position of the observing station. At the point on the chart representing the position of the gun another arm is pivoted, connected with the first (or telescope arm) by a movable collar. By suitable gearing on the gun arm, the movable collar is made to advance and recede, and the arm to move radially. By these means the telescope attached to the other arm may be directed on any object on the water, the position of which will be indicated, as before described, by a point on the collar immediately below the intersection of the arms. The same gear which governs the movement of the collar, records electrically the amount of its motion and that of the gun arm on two dials. These dials, which are placed near the gun, are graduated to show the range of the object in yards, and the bearing or requisite training of the gun.

For a moving object, Colonel Watkin employs what he terms the "predicted firing" system. The movable collar referred to above carries a pencil, which traces on the chart the movements of any object, say a vessel, on which the telescope may be directed. As both the direction and speed of the vessel are thus indicated, its position at a convenient distance ahead may be readily predicted, and the telescope directed on it. The corresponding reading on the dials at once enables the guns to be laid on this point, and when the object indicates its arrival thereat by coming into the centre of the telescopic field, the guns are fired electrically by the observer. Should the vessel change her course, and thus throw out the prediction, the process must be repeated.

Whatever point of the water the telescope is aimed at, the dials will indicate at the gun the range and training to hit the object at that point.

Now, if instead of laying the telescope on the object, we drive it forward to some point in the extension of the track, we give the detachment time to lay the gun by the indications on the dials before the vessel has arrived at the predicted point. The amount of prediction given can be varied to suit the varying skill of the detachments. For direct fire half-a-minute prediction should be sufficient. But, as the predicting scale is marked, the distances travelled over for  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and 1 minute, showing the length, the track must be extended for those times.

(g) Method of firing the gun.—In the old system, with squares, the gun was fired as the dials indicated that the vessel had entered the square. In the new system, having got our gun laid on the predicted point, we want to fire it the moment the vessel arrives at that point, *i.e.*, when she crosses the centre of the field of view of the telescope marked by the cross wires. For this purpose a low tension electric tube is employed. This, roughly speaking, consists of an iridio-platinum wire embedded in gun-cotton and powder. A current from the battery being sent through the wire heats it, ignites the gun-cotton, and fires the tube. Those acquainted with electri-



city will know that if the observing station and gun are some distance apart a powerful battery would be necessary to supply sufficient current to fire the tube. To get over this the observer, when he wishes to fire the gun, presses a button, which attracts a magnet of what is called a relay, and by this means closes the circuit of a local battery through the tube. To avoid any possible accidents, the firing arrangements have been designed—

(a) So that the individual gun cannot be fired until its own gun captain has given the permission by inserting a plug.

(b) None of the guns of a group can be fired until the officer in charge of that group has given permission by moving a switch handle to the word fire. Until these operations have been performed the observer at the distant station cannot possibly fire the guns.

#### COMPARING D. R. F. WITH POSITION-FINDER.

With D. R. F. we have—

1st. To find the range.

2d. To transmit this range to the gun, and then to communicate to the officer in charge to what targets this distance refers.

3d. Corrections for displacements have next to be made.

4th. The gun has now to be laid.

The transmission of ranges from D. R. F. to gun groups is a difficulty not very satisfactorily overcome. I entertain grave doubts as to the practicability of working with the dial indicator range in large fortresses where guns are distributed over wide areas in time of war. It is now generally conceded that the D. R. F. must be placed at as safe a distance from the group as possible, although they must be necessarily greatly exposed. The number of men required to work dials in a fort, say, like Nepean, would be a serious drain on the garrison. Then there is the great difficulty of ascertaining to which target a range refers. This would be largely accentuated in time of war with several vessels attacking. Of course electric dials working with D. R. F. would to a great extent modify these disadvantages.

Now the position-finder gives at once the actual range and bearing to enable the gun to hit the ship, and this range and bearing is recorded automatically and instantaneously in the emplacement. No corrections of any description require to be made. Laying is quicker generally. Then, even if dials and electric communications all go wrong, the P. F. is as good, in fact a better range-finder than the D. R. F. The P. F. has also the advantage of requiring fewer men to work the system. A P. F. once set up does not require adjusting. D. R. F. requires to be levelled every time it is used. With P. F. there is no difficulty about identifying the required target. The observing instrument being larger, better readings can be obtained. For night firing the P. F. would have a great advantage over the smaller and less accurate instruments, especially with regard to lighting arrangements.

To sum up, the P. F. gives the best form of fire direction and the best natures of fire control. Steady fire can be maintained, independent of smoke, from a safe position, apart from the noise and confusion of action. The

firing arrangements are instantaneous and safe. No gun can be fired without the full knowledge and the concurrence of three persons, viz., the fire commander, the gun group commander, and the gun captain.

#### IDENTIFICATION.

The F. C. should have in his possession tables and identification sheets of the navies of the world, and he should make himself familiar with every particular concerning every vessel within ordinary striking distance of his station. If the F. C. himself has no special knowledge of ships, an officer who possesses and has cultivated the gift of distinguishing vessels should be detailed to assist him. On the identification sheets the ships are arranged with a view to narrowing the work as much as possible to a comparison between types that resemble each other. Notwithstanding that every effort has been made to render the work of identification as easy and simple as possible, careful study, extending over some time, is absolutely necessary to enable an officer to master the details of the sheets so as to be capable of differentiating rapidly and correctly between vessels having many points of resemblance, but of varying types, each probably requiring special forms of attack.

It cannot be again too strongly impressed upon artillery officers that upon themselves will devolve the entire work of identification. No help can possibly be expected from the navy. Careful and continuous training for the performance of this all-important work is, I believe, an imperative necessity.

Lord Brassey's Annual will be found useful reading to G. A. officers in connection with identification sheets.

#### CONCLUSION.

A well ordered and properly constructed fortress, armed with modern ordnance of various calibres, good ammunition, communications and instruments up to date, officered and manned by smart gunners, is now a proud command.

An eminent authority says:—"The office of permanent fortifications is to avert attack. Coast fortress should be able to defend itself against any form of assault, and to protect everything within its defenses."

The efficiency of the garrison gunner is his insurances.

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#### DISCUSSION.

Lieut.-Colonel HALL.—I suppose we are all very glad that we have reached a point at which we can listen to a lecture on the tactics of coast-defenses by artillery. It has been an old experience of mine this want of information as to how to organize the forces put under one's command in fortress work, and it has been a pressing want in our branch of the service for many years past. I suppose it is about thirteen or fourteen years ago since it first fell to my lot to exercise a fortress command, and when I began to attempt the job—I had, of course, gone through the ordinary routine work of drilling with guns, and so on—all at once, the first thing that dawned

upon me was that I did not know what to do with my forces when I had got them. At that time I was smitten with a zeal to know, and with that zeal for knowledge I endeavored to get some information, but could not obtain very much. In my blind ignorance I set to work, and evolved what I thought would be the tactics of fighting my particular fortress under the conditions as they were. I committed this to writing. Now, I am sure that, judging by the standard that we have to-day, the attempt was a very crude one, and a comparison with such work as set out to-night will enable us to realize something of the advance that has been made.

In those days we had muzzle-loading guns, a very slow fire, and our range-finding instruments were *non est*. I remember our gunners were very excellent gunners indeed, but our theory was something the same as that in Donnybrook—"Whenever you see a head, hit it." If you saw an enemy you fired away at him, and put as many shots into him as you could. Now we have range-finding instruments, control of fire, and communications better organized, and so on, but when you compare things as they are to-day, as we know them, with the ideal represented by the up-to-date tactics of fortresses in other parts of the empire, I can only say that we realize that we, in this colony, are almost as far behind what we ought to be as we are in advance of what we were thirteen or fourteen years ago. Though attending to a good many of the lower portions of our work, we are, to a large extent, neglecting those higher functions, which come under the heads of Fire Discipline, Control, Communications, and Identification. Therefore, I place great practical value on this lecture inasmuch as I look upon it as an eye-opener, which will force us to reach forward to a better state of things. In the lectures we have had we have been assuming that we have here a tolerably up-to-date armament. Now, we can very readily realize that we are not up to date in one thing—position finding. I am quite with Captain Stanley on this, for it is a crying want in our fortresses at the present time; and I am inclined to think, at all events I am speaking with reserve and modesty, that we may be making a mistake in adopting a system of tactics derived from home fortresses, where the position-finder is a part of the armament in fighting our fortresses, where a proper position-finder does not at present exist. Is it advisable that we should so strongly centralize our control of fire in the present state of our communications, and in the present condition of our means of finding the position of an enemy? As I understand, the cost of supplying a reasonable number of position-finders to govern the groups in our fortresses around the Heads is not so great that we should hesitate in forcing, as far as we can, upon the government the desirability of supplying them. Then, given a position-finder, and thoroughly centralized control of fire, I think we may almost assume that when the supreme test comes some link in the chain of our defense will be found weak, and, if I may use a colloquialism, "Things may go bung." Now, the English book that is just out, which has been referred to in the lecture, realizes the possibility of that difficulty and provides for it; that is to say that, as your system of defense, your control of fire may fail at one or more points, or something may go wrong; the control will then have to be divided, and be placed in the hands of smaller units, so that finally each gun may pos-

sibly fight "on its own hook." That being so, is it not desirable that we should call for an initiative among our junior officers? At present the idea is, and a very theoretical one it is, that everything is centralized in the hands of one man, but we are making an endeavor to realize the possibility of that one man being knocked on the head early in the engagement, or his control over his guns otherwise failing, and are trying to inculcate among the commanders of smaller units the necessity of at once taking up the control and exercising the initiative. That is, I think, a very necessary thing to practice. I agree with the lecturer, too, as to the necessity of fortresses having a record book. Our changes have been tolerably rapid. A man learns as much as he can of his station, then he may go away to another fort, and whatever he has learned he takes away with him, and it is of no use to his successors. In each case he acquires a certain amount of information of the highest value. But he is under no obligation to systematize and tabulate this, or to leave it on record in any readily available way, and thus a new officer has to lose time and take trouble in going over the same ground. Palpably this should not be. The odds and ends of information which have been catalogued here are of very considerable length and value, and very little consideration will enable you to realize how very useful such a record might be. Now, as far as we know these records do not exist, and it is nearly time that some start should be made in that direction. I have been very much interested in the lecture. I knew that it would be of value to my own branch of the service. In many respects it is an eye-opener, and I hope that one and all of the garrison artillery here to-night will endeavor to push on towards the goal which Captain Stanley has put in front of them, viz.: to make our fortress defense an ideal one.

Major OUTTRIM.—On the question of the identification of ships, what is the law of nations with regard to showing colors? Supposing you have, as you will have, landmen in charge with no knowledge of shipping, and a man-of-war is approaching showing no colors, is it permissible under the law of nations for an enemy's ship to fly the flags of a nation with which they are at war—to sneak in under false colors? With regard to the record book, that is a want that must obstruct every commanding officer going into the forts with no knowledge except what he can pick up. There is no record with regard to armaments or any other matters that it is important he should know. I agree with Colonel Hall that we are very much indebted to Captain Stanley for his most useful and attractive lecture.

Major TOPE.—I am exceedingly pleased and interested in the lecture this evening, and the information I have gleaned is of great value to me. One thing has always puzzled me: the lecturer gave us an instance of a supposed attack by vessels fighting with a certain formation and in a certain way. I am taking the position of battery commander at Gellibrand. We see certain vessels in the distance, which probably are disguised, and which we presume to be certain cruisers or line of battle ships. We have tables and information (or we are supposed to have them), and we must look up all this information and find out how we are to fight those ships. But in the meantime these ships are coming on, and, by the time we have made up our minds what to do, they may have passed out of sight or blown some



of us away, or rendered us incapable of making any resistance at all. I think General Geary, in a paper before the Royal Institution of Artillery, lays stress on that point, and he worked on the principle of saying—"Here's a ship, let's hit it, no matter with what, as often as possible. She may have a belt of armor or be a protected cruiser; we have certain guns, let's use them to the best advantage." Quick-firing guns would be used to keep down the personnel of an enemy, and I agree with the lecturer with regard to black powder. The quick-firing guns, it has always been understood from the first, must have smokeless powder. That is a thing we are very much behind in here. A fortress record book is a most desirable thing in every way. It takes an officer a considerable time to learn his gun; every gun has its equation, and if that can be turned up in a book, the commanding officer, before he uses his guns, can find the history of certain guns and compare them with other guns. Of course, where we have muzzle-loading guns and breech-loading guns side by side in the same fort, where we have to indicate the ranges of B.L. and M.L., only by the one dial, I think it is absolutely necessary that the group officer should have some information telling him that his gun shoots 50 yards short of the range he will get, or *vice versa*. I speak from my own experience with regard to our B.L. guns, and I find that they shoot short of the M.L. guns. The quick-firing guns, on the other hand, shoot over and beyond.

Lieutenant OAKLEY.—I should like to give my ideas of the commanding officer's work, speaking from a group officer's point of view. At present we are supposed to go as near as possible to the actual conditions of war, but it seems to me that as soon as we would start fighting a great change would take place. There would be some alteration in our system of defense. For instance, it does not appear probable to me that our commanding officers would long occupy the positions they do at present. They are there simply as a target for the vessels coming in. I think when we make our dispositions in peace time, they should be as near what would be our places in war time as possible. For instance, the positions for finding range would be greatly handicapped by being where they are. Take a misty day, when the atmosphere is heavy, and when through the black smoke the guns would be obscured from the instrument finders, then these would have great difficulty in finding the range, and the smoke would deter the group officers from seeing the dial. It is very difficult in peace times to do this, but under war conditions it would be impossible, and I am sure an enemy would not stand very long as a target in one position. It seems to me that when arrangements are made for finding range that this should be taken up in some way when we are at practice, and not left for a time when we find we won't be quite so much at home in all those details which should have been rehearsed at practice. Again, whenever we go into practice it is taken for granted that no damage will be done to anybody. So a group officer has no opportunity for "running his own show," as Colonel Hall put it. He gets an idea of placing reliance on somebody else, and loses the opportunity of gaining information and of getting confidence in himself which he ought to have. We should have no surprises sprung upon us, and all the positions should be taken up and no loop-hole left through remissness

at practice. I am very much indebted to Captain Stanley for his lecture, and only wish we had more of it.

Captain MONASH.—I desire also to render cordial thanks to Captain Stanley. It is always fascinating to listen to details of a well-organized scheme, but I am very much inclined to indorse Colonel Hall's remarks that the attempts to adopt such a complete scheme of defense here must result, as it has done, in very considerable discouragement. Garrison artillerymen will admit that the very fact of having a complete system of coastal defense brought before them in this pithy manner leaves an impression on their minds of discouragement; it makes us feel how powerless we are to live up to the ideal set before us. With the material put into our hands it might be thought by outsiders that a great deal would depend upon ourselves and our own intelligence in improvising details to fill in the deficiencies in our equipment; but that is not so; the deficiencies are so serious that I think we are unduly hampering ourselves in endeavoring to carry out even in outline such a complex conception as that of fighting a complete coastal fortress from one responsible head. It is very much the same as if a field force were sent into the field without signallers, engineers, or ordinary equipment—as merely a band of riflemen without the necessary adjuncts for carrying on field tactics. What would become of the field tactics if you cut out such minor but necessary adjuncts? These adjuncts are, in the case of garrison artillery, not at all minor—they are the principal features in the arrangement of the whole system. It was within my own experience that we passed from the stage of individualism to the stage of collectivism, if I may call it so, by grouping together and concentrating the garrison artillery work. I realized very soon that we were aiming at something we could not effectually carry out with the means at our disposal. But, apart from this local question, it occurs to me to ask the lecturer to express his views on the probability of this very complex system being completely effective or not when put to the test. Has it, in point of fact, ever been put to the real test, and is not the machine too complex a one to work successfully under conditions of a severe trial? There has been a very great deal of valuable information put before us, and when it is published I shall regard it as a very excellent handbook for reference.

Captain STANLEY replied as follows: I am exceedingly gratified with the kind manner with which you have received this, from my stand-point, very incomplete lecture. I had aimed to do great things. I had determined to lay before you to-night a thorough picture of the responsibility of the fire commander from every possible stand-point, from the initiation of his taking the command, following through his organization of his fire control, his fire tactics, and his fire discipline, but the disabilities under which I have labored have been very great, and I have before me to-night a very considerable amount of matter I did not inflict upon you for two reasons; one reason is that in the lectures I gave to the artillery sections of this institution, I felt it very strongly my duty to impress upon you two particular points—the identification of ships especially, and how to attack armor. I wanted to cull from lectures I have delivered on this subject the points to impress upon you; but it occurred to me that several of you had listened

to these lectures before, and if I were to dwell upon these matters again, although sufficiently valuable for reiteration, you might think that I have come to pump up some old lessons which you had heard before. I wanted to bring before you several of the details in connection with the electrical firing of guns and the identification of ships, but having dealt with them before I trust that some of my notes may be published. I have refrained, wisely, I think, from recapitulating them. Colonel Hall mentioned that he would like the smaller units of a fire command to take the initiative; before I come to that I would like to go a step further. I would like to see a much more important thing accomplished, viz., the higher units, the fire commanders themselves, to have a better opportunity of exercising their initiative. I would like to see the fire commanders take their identification sheets—which I am sure are rendered so plain, inasmuch as they are prepared in such a simple and easy form that with ordinary study any man, whether he has a knowledge of ships or not, can master the details—and practice with them. The drill-book lays down a series of instructive experiments which can be carried on by subalterns, in which they would, for the moment, imagine themselves battery commanders and commanders, and so on right through the chain, and they would have examples before them of what would be done under certain circumstances. Any officers having these examples set for them should be able to answer questions such as to satisfy the general officer in command that they are not only thoroughly capable of taking up a battery commander's position, but also of taking a fire commander's position. This will answer one portion of Captain Monash's question. I do not regard this system as being a fallible one. At the outset, when the tactics of coast defense were first broached, many older officers said, "This will absolutely break down. Your communications will come to grief. Everything will go wrong." The answer I give to that is—that nearly all those officers who have had very many opportunities of watching coast fortresses in action have come to the conclusion that they have been unnecessarily alarmed, and that what looked very difficult is comparatively simple. As to the question of communications breaking down, in every properly organized fortress there is a second, and possibly a third system in case of a breakdown, and that system is thoroughly inculcated into the minds of everybody concerned, and all are fully prepared to deal with the second plan in view of the first failing. That being the case, I don't think we would be wise in rejecting a superior plan, especially when we have a second to fall back on.

As you will have noticed in my account of the fortress record book, it is laid down what secondary lines of communication would be in existence, what places there were for them, and what would happen in the third place—that of commanders fighting their own guns or groups on the bracket system. With regard to Major Outtrim's question about the identification of ships' colors, I may say in war time we have no colors at all. It would be narrowed down in this way: if war took place, the Admiralty and Intelligence Department would furnish here a description of every ship within striking distance, or within five or six days' sail; the identification sheets would then be sorted out, and you would keep before you only such sheets

as would be required, the rest put away in their boxes. With regard to disguises, it is admitted that the day of disguises is over; that in order to disguise herself a modern ship would have to build up a lot of wooden affairs to effectually alter her appearance, and this would be a danger to her, and would hamper the movements of the crew. I do not say it is impossible to disguise ships, because it has been done lately. Major Hanby asked for further information on the identification of ships; but my lecture on "The Identification of Ships" dealt with the question so thoroughly that I was afraid to inflict further particulars upon you to-night lest I should weary you. Major Tope spoke about the same subject, and said that while we were taking the trouble to look up a passing vessel, she may have passed away or blown the fortress into the air. He also quoted a remark by General Geary of—"Here's a ship, let's hit her." Well, gentlemen, that may be very sound advice, but I think it would be better for you to know what she was and how to hit her. Concerning Lieutenant Oakley's remark about the danger of a commanding officer's position, I should like to say that in any modern fortress the commanding officer would have his proper fighting station, and it would be something short of a miracle if an enemy were able to touch him, and the only chance of hitting him would be analogous with that of some one aiming at a house and hitting a haystack. With regard to casualties, it is distinctly laid down that drill should be practised with casualties, but, in view of the fact that there is so little time for the garrison artillery militia to do their work in, that it has been found up till now, and I think commanding officers will agree with me, it has taken them all their time to fulfill the duties they are called upon to perform in peace time, and to give a decent account of what is required of them, without taking into consideration the additional difficulties of providing against casualties. Of course, they want a longer training. With regard to Captain Monash's remark, that we are handicapped in carrying out tactics under existing conditions, I feel some difficulty, and I think I must express a very guarded opinion. I believe, knowing what I do of the qualities of the officers of the Garrison Artillery Militia, that if they got a fair chance of studying the present coastal defense system of tactics with the various data before them, which would be the very breath of their nostrils in dealing with their work, I have not the slightest hesitation in positively affirming that they would be able to fight the forts on the principles laid down in the "Garrison Artillery Manual." My own opinion is that these principles are not more difficult than a haphazard way of fighting. In conclusion, I trust very sincerely that we shall not only have our fire commanders told off to their positions, but that they will be enabled to do all that is required of them, and to give a good account of themselves by fighting their forts in such a manner as to reflect credit upon themselves and their command. I am very grateful for the patient bearing you have given me, and for your kind consideration of the disabilities under which I labor in giving this lecture to-night.



## Military Notes.

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### TURRET OF THE BATTLE-SHIP "MASSACHUSETTS" UNDER FIRE.

**A**N experimental turret, representing similar structures on the United States battle-ship *Massachusetts*, was tested last spring under conditions such as will obtain in an actual sea fight, and we are now enabled to present our readers with photographic reproductions which show how it stood the ordeal.

The ballistic tests which are continually being made upon armor plate furnish very complete information regarding its ability to keep out projectiles. There is not a battle-ship in any of the navies of the world regarding which a naval expert could not tell us the powers of resistance possessed by its armor. There are other questions, however, to be considered in addition to that of the mere resistance of armor to penetration. The plate would afford but little protection unless it were well supported or "backed" by the framing of the ship itself. Even if a shell should fail to get through, there is a possibility that it will drive the plates bodily within the structure of the ship, racking and distorting the skeleton framework to which the armor is bolted. Our readers will remember the test made last year of a structure representing the sides of the battle-ship *Iowa*, which was illustrated in the *Scientific American* of November 9. The results showed that the framing had ample strength to hold the plate up against the heaviest shells.

It was felt by the Bureau of Ordnance, however, that the experiments would not be complete until a test had been made of the armored turrets of our battle-ships. The fact that the framework of the ship itself could stand the impact of heavy projectiles was no proof that the revolving turrets, which carry the big guns, would be equally secure. A slight deformation of the plates and beams of the backing, which would be of but little consequence in the fixed sides of the ship, might interfere with the working of a huge turret, rotating as it does on a circle of steel rollers, and having clearances of only a few inches between itself and the walls of the barbette. Even if the structure of the turret itself were not distorted, it was possible that it might be moved bodily upon its supports, in which event the elaborate gear, hydraulic or otherwise, for turning the turret would be disabled, and the whole mass, with its two big guns, constituting one-half the main fighting power of the ship, become wedged in its seat and rendered all but useless.

It was determined to make a test of an experimental turret which should be practically, at least for the purposes of the test, a fac-simile of the turret of the battle-ship *Massachusetts*. A solid foundation of piling covered

with heavy timber was built, and upon this was laid a circular track of wrought iron plates, answering to the roller track of the *Massachusetts*. The experimental turret was about 27 feet interior diameter and 11 feet high. Its framework, consisting of vertical angle frames and horizontal channel irons, carried ten cast-iron plates, 15 inches thick, and one steel test plate representing the turret armor of the *Massachusetts*. Interior girders, similar to those used for carrying the gun, were built in place, and 180 tons of pig iron were so disposed within the turret as to represent the actual weights of the gun and gear. The weight of the complete structure was 450 tons, and it was carried on twenty cylindrical rollers of steel, which were prevented from transverse movement by means of wrought iron wedges. The experimental steel plate was one which had already been used in experimental tests, and had successfully resisted two heavy armor piercing shells, the points of which were embedded within it. In the present experiment three rounds were fired, as per the accompanying table :

	Round 1.	Round 2.	Round 3.
Gun. ....	10 inch.	12 inch.	12 inch.
Projectile.....	500 pounds.	850 pounds.	851 pounds.
Velocity .....	1683 foot secs.	1701 foot secs.	2000 foot secs.
Energy.....	9829 foot tons.	17,069 foot tons.	23,626 foot tons.

The first shell, a 10-inch Wheeler-Sterling, broke upon the plate with a penetration of  $9\frac{1}{2}$  inches. The point of impact was  $14\frac{1}{2}$  inches from the top of the plate and 2 feet to the left of the second of the points of impact above mentioned. A piece of the plate above the point of impact, 33 inches wide, was carried away, and the roof plates of the turret were wrenched upward to a height of 1 inch. The armor bolts were uninjured and there was no movement of the plates on the turret. The whole turret was moved backward on its rollers for a distance of  $1\frac{3}{4}$  inches.

The second shell struck the turret at an angle of  $7\frac{1}{2}^{\circ}$  from the normal. This projectile penetrated  $11\frac{1}{2}$  inches and broke up, the head remaining welded to the plate. The plate was cracked diagonally through the last shot hole and through one of the old points of impact to the bottom of the plate. One armor bolt was broken and driven into the turret. The adjoining cast-iron plate to the right was slightly displaced. The horizontal channel irons of the framework were buckled to the extent of one inch. The splinter bulkhead to the left was buckled to the extent of 3 inches. The turret itself was carried to the rear a distance of  $7\frac{1}{4}$  inches, and was also turned about its axis slightly. There was no distortion of the structure considered as a whole.

The third shot was a Johnson fluid compressed steel armor-piercing shot, similar to that shown in our last week's issue, but 12 inches in diameter. It carried a soft steel cap and weighed 851 pounds. It struck the plate at an angle of  $21^{\circ}$  from the normal, at a point about 3 feet from the left edge and three feet from the top of the plate. It will be noticed that the angle of impact was very large, and when the shot struck the plate, instead of following the line of fire, it turned sharply to the right and passed entirely through the plate on a line nearly normal to its surface.

The shot broke up in forcing its way through, the larger pieces going

through the covering plate on the rear side of the turret, piercing the backing, smashing off a large portion of the rear cast-iron plate, and finally going into the woods behind the target.

The back of the ballistic armor plate was broken out for a diameter of two feet around the hole; pieces of the steel being driven through the turret and scattering in all directions. The backing was carried away and splintered; the plating behind the backing being folded back and wrecked over an area of  $3\frac{1}{2}$  feet square. Rivets were sheared and flew all over the turret, leaving their marks on the interior. The channel beam at the rear of the shot hole was ripped off and thrown across the turret. A jagged hole, 7 inches in diameter, was torn through an adjoining deck beam. The interior vertical covering plates on the opposite side of the turret were pierced with eighteen holes and showed numerous deep gouges and scars caused by the flying fragments. The turret structure over an area of 4 square feet where the shot struck was badly wrecked. The backing on the rear side was wrecked and splintered and the 15-inch cast-iron plate badly cracked, two large pieces of the latter being thrown to the rear, leaving a triangular hole 4 feet high and 4 feet wide. All six of the armor bolts holding these plates were broken, and the plate itself was forced to the rear 9 inches on one edge and 2 inches on the other. This impact moved the turret 9 inches to the rear in a direction making an angle of nearly  $8^\circ$  with the line of the movement in the two previous impacts. It also revolved around its centre to the left through an angle of  $2^\circ$ . The result of the test proves that the framing of the turret has ample strength to resist the heaviest strains that could come upon it under fire. The fact that the turret as a whole moved as much as 9 inches under the energy of the shot raises the question of the sufficiency of the means adopted to hold the turrets of our battle-ships in place. As at present constructed, the tendency to translation of the turret is resisted by the flanges of the steel rollers upon which it revolves, and it is estimated by Commodore W. T. Sampson that these flanges present an ample margin of strength to resist the shearing action to which they are subjected. When the 33,000 foot tons of energy of a 13-inch shot is communicated to the turret, a part of it is expended in piercing or breaking up the plate and part of it causes the whole turret to move until the roller flanges take hold of the edges of the roller track. According to the last authority, the pressure of a 13-inch gun against its recoil cylinders when it is fired brings a strain upon the roller bearings far greater than they can ever experience under the momentum of a heavy shot. Altogether this very interesting test establishes the excellence of the system of turret construction as carried out in our new battle-ships.

Referring to the destruction wrought in the interior of the turret by the flying fragments of the successful shot, it is evident that had the turret been occupied by actual guns and gun crew, the gun itself and the larger part of the crew would have been disabled. It is also noteworthy that successful penetration was effected in spite of the fact that the shot struck at a high angle of incidence, and there is no doubt but what it was largely due to the action of the soft steel cap, as explained in our last issue.—*Scientific American*.

## HORSE ARTILLERY AND CAVALRY.

A lecture at the Prince Consort's Library, Aldershot, was given by Major E. S. May, Royal Horse Artillery, on the above subject. Major May at once proceeded to briefly sketch the origin and the *raison d'être* of the Royal Horse Artillery, and also the great necessity which to-day existed for great mobility on the part of field artillery, so as to cover extreme distances at an unbroken pace. The duty of the Royal Horse Artillery, he considered, in a big battle of the future, would probably be that of effecting wide turning movements, in conjunction with the cavalry. They would find that they could procure examples to illustrate almost every feature of war from the battles of 1870. Having quoted a number of such instances, the lecturer said that he was sure that one such instance would afford great pleasure to his friends of the cavalry regiments, namely, where, on the occasion when the French infantry were being driven back by the advance of the German Twenty-second Division, near Neuville: to cover their retreat before the advance of the German Twenty-second Division, a twelve-pounder battery of the Reserve Artillery came into action. The movement was observed, and a squadron was signalled to approach and be concealed, and when it was ascertained that they were certainly guns, this squadron rushed out and seized them before they could possibly recover and come into action. It was a splendid achievement, and was only an instance of what could be done by surprise. He felt sure that its lesson would be appreciated by the officers of the cavalry regiments present. The lecturer proceeded to give similar illustrations as to the part that could be played by the rapidity of action in flank movements, the study of which would well repay attention on the part of officers, and valuable deductions in almost every sphere of tactics could be drawn from them. The operation of the 2d of December, in 1870, was treated at length by the lecturer, and particularly the incidents which immediately preceded the attempt by the French to relieve Paris. Estimating the German performance in its various aspects, he pointed out how the German batteries, by the opportune movements which they effected, stemmed the rush of French advances and forced the hostile skirmishers while their comrades rallied behind their guns; and how subsequently they repeated the process when they fell back on to their second position—it was here that the artillery manifested itself. The lecturer sketched in outline some of the positions occupied by the troops in this memorable campaign, showing that in all cases a frame of work of advanced artillery really constituted the backbone of the situation, and that the *morale* effected by this judicious employment of the artillery arm was mainly instrumental in accomplishing the well-known results of the campaign. It rested, however, in the unison which could be effected between the cavalry and the horse artillery arms as to how far those advanced and frequently important operations could be successfully conducted, particularly when flanking movements were contemplated. The rapidity of fire and the precision of modern ordnance, with the introduction of shrapnel in place of case-shot, while retaining many of the principles on which horse artillery and cavalry had previously acted, had yet altered the situations occurring each moment during the earlier stages of the combat, but mainly



in one direction, namely, of increased mobility. The lecturer advocated increased mobility for the field artillery arm to cope with the altered conditions, but pointed out the unique place in which horse artillery must still occupy in the battles of the future. The illustrations he had given were not numerous, but they were based upon the opinions of such authority as Prince Kraft. He trusted that he had shown that the horse artillery arm, with the assistance of modern innovations, such as mounted infantry, would have to play such an important part in the various stages of a battle action that nothing but combination could insure success.—*United Service Gazette*.

#### THE STRENGTH OF THE BRITISH ARMY.

According to the latest returns received on January 1 of the present year, the general total of Regular troops at home and abroad was 221,194, of whom 106,100 were at home, 33,644 in the colonies, and 78,043 in India, while to aid in the grand work of restoring prosperity to Egypt, which we have taken in hand, there were but 4407 Regular troops retained in that country. The average number of men in the army during last year was the highest on record for the last twenty years, being 220,309. Of these 19,536 were cavalry; 37,124 artillery; 7664 engineers; 5905 foot guards; 137,233 infantry of the line; 5009 colonial corps; 3487 army service corps; 1165 ordnance store corps; 2541 medical staff corps, and 555 army pay corps. We have here a very strong proof that the efforts that have been made to improve the position of the soldier and to increase his comforts are bearing fruit, for there has been no special depression in trade to account for filling up the ranks as has in some other years been the case. The total number of recruits, however, obtained last year was 29,583, of whom 29,194 were raised at home, a smaller number than in any year since 1889. Scotland and Ireland account for only 2892 and 3145 respectively, the rest being provided by England and Wales.—*United Service Gazette*.

#### COL. SLADE ON THE LEE-METFORD.

SIR:—In the *Spectator* of Oct. 17 there appeared a letter signed "C. M.," and with your permission I should like to answer the first portion of it, viz., that relating to the bullet of the service rifle. The Lee-Metford rifle was not introduced hastily into the service, nor "was it adopted on account of its trajectory only." The Small Arm Committee had the whole question under consideration for upwards of three years and subjected the rifle to the most exhaustive tests. The trials to ascertain the smashing power of the small bullet and its penetration into steel plates, sand, rammed earth, balks of timber, and other substances, convinced the Inspector-General of the Cavalry and all the officers of the Army Medical Staff and the Veterinary Department who assisted at the trials that cavalry would fare no better against the 0.303 in. bullet than against the 0.402-in., the War Office having decided in 1885 to adopt the latter calibre. The Martini-Henry bullet often failed to stop by shock the Soudanese Arabs and the Zulus, many of whom charged right up to our men when struck in a non-vital place and having no bone broken; and to stop a horse or a savage by shock alone would require a bullet as large as an orange. In savage war-

fare a few isolated cases will occur of individuals coming on although struck by one or more bullets, but the result of an engagement would not be affected. To go back to a large calibre rifle would be a retrograde step and a deplorable error. All the Continental powers have deliberately adopted a small bore, and in one or two instances of late years a still smaller calibre than ours, viz., 0.256, has been taken. In addition to the many advantages possessed by a small-bore rifle over the Martini-Henry it was a political necessity, as every nation in Europe had adopted, or was about to adopt, a small bore, and England cannot afford to lag behind her neighbors in matters of armament. The Lee-Metford rifle at the time of its introduction in 1888 was probably the best military rifle in Europe. Since then inventors have not rested from their labors, and it is possible that the time has arrived when we should reconsider the question of the infantry arm, but not in the direction advocated by "C. M." The Lee-Metford rifle is not a perfect weapon, but it is a thoroughly sound and reliable arm; still it is capable of improvement. The chief faults are excessive weight and the time required to load or charge the magazine. As regards the bullet, steps have already been taken to increase the stopping effect, but penetration will be sacrificed and possibly extreme accuracy; that, however, is of little account. "C. M." may rest assured that we shall never resort to a larger calibre; the advantages of the small calibre are so overwhelming and may be summed up as follows: Greater extent of ground covered by fire using the fixed sight only, diminished recoil, increased penetration, greater accuracy at all ranges, and lightness of ammunition, allowing of 115 rounds being carried for the same weight as seventy Martini-Henry rounds. The rifle of the future will probably be of slightly smaller calibre than 0.303, will weigh 2lbs. less, and the magazine, holding eight cartridges only, will be capable of being charged either by putting in all eight cartridges at once or one by one as desired. C. G. SLADE, Colonel, late Member of Small Arm Committee.—*The Army and Navy Gazette*.

## A REMARKABLE MARCH.

General Grodekoff, a Russian general who made a name by a ride to Herat some years ago, and now holds a command on the Amur, gives an interesting account of a remarkable march of nearly 5000 miles made by Russian troops. This account appears as an order of the day in the *Invalide Russe*. "After a march of nearly a year's duration, the 4th and 8th Battalions of the Line of Eastern Siberia, as well as the 2d and 4th Batteries of the Artillery Brigade of Eastern Siberia, arrived in their new encampments in the Amur district in the middle of June. These troops marched over 7000 versts (say 4700 English miles), of which 4000 were by land and 3000 by water. The most trying part of their journey was that accomplished on rafts between Chita, Stretensk, and Blagovestchensk, or about 1500 versts, between the middle of May and the middle of June. The weather was cold and rainy, and the rivers were very swollen and their current rapid. To overcome these difficulties, the men had to work 14 hours a day. At certain stages of the journey the body of the troops covered an extent of 20 versts between the advanced and rear guards. During the

whole of the march the losses were only two officers and four soldiers dead, two officers and 25 men left behind in the hospitals along the route. The batteries lost 29 horses. After their arrival I reviewed these troops on three separate occasions, and found the men in good condition and excellent spirits. Two hundred years ago another Russian force made a similar march to defend the fort of Albazin against the Chinese in this very same Amur region."—*United Service Gazette*.

VON MOLTKE'S MILITARY CORRESPONDENCE.

The Prussian General Staff has just published the second part of the third volume of "Count Moltke's Military Correspondence, from September 3, 1870, to January 27, 1871." In a letter to the Emperor, dated December 1, 1870, Moltke says:

"The question when a bombardment of Paris shall or can begin must be decided on military grounds. Political reasons can be taken into consideration only in so far as they do not entail anything inadmissible or impossible from a military point of view. The former would be the case if politics were to dictate the commencement of the cannonade before the means required for carrying out the same were at hand. The latter—that is to say, the requiring of the impossible—would be the case if the speedy placing in position of the necessary material were demanded in face of the fact that the French had successfully obtained a large number of heavy guns, with the requisite ammunition, from Cherbourg, Lyons, or Toulon. The 'military men' who support the demands of the political party seem, according to the report of the Federal Chancellor, to have overlooked the fact that the Government of Paris had, for the purpose alluded to, absolute control of several railway lines, whereas the heads of the Prussian army had at their disposal only one line, which was exposed to infinite disturbances of traffic, and which, up to quite recently, only ran to within sixty or seventy miles of the position of the siege park. In this alone lies the sole explanation for the delay of the artillery attack. The enclosures (No. 1, Report of Colonel von Rieff from Versailles, dated November 28, 1870; and No. 2, Accompanying Report of the Commander-in-chief of the Third Army, dated November 30, 1870) are more explicit on this subject, and explain how, in spite of assistance provided by the horses of the ammunition columns, by the teams of the commissariat wagons, and requisitions from the vehicles of the country, it has not, as yet, been possible to bring about the much-desired advance of the heavy ammunition, which alone weighs from 2500 to 3000 tons. It must be acknowledged that an extensive use of the horses of the ammunition columns might tend to restrict the army's freedom of action. Nor should the teams of the Commissariat Corps have been used to any great extent. How difficult it has been to obtain requisitions from the vehicles of the country, and how little the latter are in general adapted for the transport of the heavy siege ammunition, is explained more fully in the enclosures. From these there can be no doubt that, up to the present, a more expeditious advance of the ammunition has not been feasible. The extension of the railway to Lagny, the bringing of suitable carriages from Berlin, the further temporary disposition of draught horses from

the ammunition column contemplated by the Commander-in-chief of the Third Army, and the possible hiring of 500 to 1000 two-horse wagons (for the transport of which to Lagny about thirty railway trains will be required) through the contractor, Hugo Knopf, of Erfurt, also proposed by the above-mentioned officer, will probably make it possible to commence the bombardment of the forts at the south front by the middle of next month. This is, however, regarded as the last resort for overcoming the resistance. Close investment and starvation must at the start be considered as a sure, if slowly operating, means for the accomplishment of the end in view. As, moreover, the campaign will be decided not here but when the enemy's troops now operating in the open country are beaten, it would not be advisable to carry the formal siege beyond the cannonading of the forts, which would demand great sacrifice of men. As regards, finally, the projected secondary attack on the north front of Paris, the same difficulties would have been encountered, up to a short time ago, in arranging the preliminaries as has been the case with the south front, viz., the obstacles in the way of bringing up the ammunition."

#### CAVALRY SCOUTS.

The *Invalide Russe* has recently published new regulations concerning the constitution of the special body of cavalry scouts, which have been approved by the Czar on the advice of the Council of War. This is a matter that has long received very careful attention in Russia, where it is maintained that the work of scouting can only be confided properly to picked men, of assured intelligence, physically vigorous, with keen sight and excellent hearing, who have been subjected to special training. Of such selected men sixteen will serve with each squadron, and will receive the prescribed instruction, which will be given also to all non-commissioned cavalry officers. In order that the best men may be secured for the service, the principle of selection will operate continually. Those who prove inapt will be replaced by others, while men who display high powers during a continued period will receive a special badge on the shoulder-strap, and will enjoy particular advantages. Great care is bestowed upon the mounting of these scouts, and their training is directed in each squadron by an officer selected for his special interest in scouting and his physical aptitude for the work. One advantage given to the scouts is that, after two years' service, they will be promoted as supernumerary non-commissioned officers, without having gone through the special training grade, on the condition that they remain on the roster for scouting duties.—*United Service Gazette*.

#### NEW 9-2-INCH WIRE GUNS.

Five new land-service 9.2-in. wire guns of special pattern are now being completed in the gun factories of the Royal Arsenal at Woolwich. They are the longest guns, in point of number of calibres, that have ever been built by the British government, being 445 in. in length—only  $\frac{1}{2}$  in. less than the 12 in. or forty-six tons—or  $48\frac{1}{2}$  calibres over all. Whilst upon the lathes, which have been put up in the recently-erected shops, these guns look very remarkable, as their diameter outside is small, and one almost expects to see them lowered into the shrinking pits in order to have an-



other jacket passed over the breech. This reduction of diameter is extraordinary. It has, of course, been obtained by a vast extension of the employment of wire in their construction. We only trust that the authorities are not going too far in this direction; at present it seems as if the whole substance of the new guns was being made up of wire. We understand that a distinction is being made between the land-service and sea-service 9.2 in. guns in this respect, the latter being wired all along the tube, or "tube-wired" as it is called, whilst the guns now under consideration are not treated in this way. It will be remembered that the *Powerful* and *Terrible* have four 9.2 in. guns of the new pattern. They are 4 ft. 1 in. less in length than the land-service weapon.

The rifling of these guns increases from 0 to a sharp pitch at the muzzle, so that as there is a complete revolution of the grooves within the bore the view of the spiral from the breech is very curious. The breech gear is similar to that of the 12 in. wire guns, except that more gun metal is used in its construction and, instead of a hand-wheel, there is a winch handle for opening and closing, with a heavy gun-metal ball to balance it upon the opposite side of the spindle. The firing gear, which is both for percussion and electric systems, has separate locks for each system of the simplest character, which can be adjusted or detached in a moment.

The initial, or rather muzzle, velocity of the sea-service 9.2 in. gun of the new pattern is 2347 foot seconds, with a total muzzle energy of 14,520 foot tons, but the extra 4 ft. 1 in. of bore in the land-service gun will enormously enhance the value of these features, as a larger quantity of cordite can be consumed before the projectile leaves the muzzle of the weapon.

We understand that it has definitely been decided to adopt the improved 9.2 in. gun as a medium between the 6 in. quick-firer and the 12 in. 46-ton wire gun, and that the manufacture of further 10 in. guns will not be proceeded with at present, at least for naval service. This is a most sound principle to adopt, as the fewer classes of gun there are, the easier it is to reduce the quantity of stores and gear which are indispensable for their repair and maintenance on board ship, and the less chance is there of confusion and mistakes occurring in regard to those stores.

The mountings for the guns of the *Terrible* and *Powerful* are somewhat complicated, but not so much so as earlier ones for guns of this calibre. They can be worked either by electricity or hand gear. Heavy shields or hoods surround and enclose the guns, being 6 in. thick in front and thinning off to 4 in. at the sides. They are of nickel steel and not carbonized, we understand. Five of these mountings have been made, four for the two great cruisers and one for reserve.—*Army and Navy Gazette*.

#### SPAIN'S MILITARY STRENGTH.

The effort made by Spain during the campaigns in Cuba and the Philippines has been prodigious. Thousands of young men filled with high ambitions and inspired with true patriotic fervor have gone forth to be shot down in guerrilla warfare, to die by pestilence, or to sicken away in fever, bred of miasma and want. High credit is due to General Azcarraga, and it cannot be attributed to him that the training was insufficient, and that

generals long proved unequal to the difficulties of their task. In Cuba, including the reinforcements of the eleventh expeditionary corps, but without counting volunteers, there are 107 battalions of infantry, six guerrilla companies, three of the Guardia Civil, one disciplinary brigade, four squadrons of cavalry, two regiments of mountain and two battalions of field artillery, and two battalions of sappers, besides battalions of telegraphists, railways troops, etc., numbering in all some 200,000 officers and men. The strength in Porto Rico is about 6000, and the *Revista Tecnica* has lately given the force in the Philippines at 36,760, of whom over 14,000 are native infantry. At home there are with the colors 64,190 infantry, 14,346 cavalry, 11,774 artillery troops, 5294 engineers, and 2400 men of the Army Service establishment, making in all, with 14,679 of the Guardia Civil and 14,186 gendarmerie, a total of nearly 129,000 officers and men. Thus Spain has at present in the field and at home an army of more than 371,000 men, and has given evidence of great physical resources and of national energy that should bear good fruit in establishing her position among nations.—*Army and Navy Gazette*.

#### THE MANŒUVRES IN GALICIA.

The *Reichswehr* of Vienna gives an account of the various innovations at the late grand manœuvres in Galicia. For the first time telephonic sections were attached to the army corps, each being supplied with the apparatus necessary for the establishment of three stations, and sixty kilometres of wire. The appliances were similar to those used in the telegraphic service of the cavalry. A trial was also made of dried sauerkraut and preserved vegetable soup for the men. A kilogramme of the first supplied fifty or sixty rations, and required to be boiled for an hour before using. It seems not to have been greatly liked. A kilogramme of the vegetable soup provided rations for 350 or 400 men. Several various models of filters were also under trial, and sundry methods of purifying water. Lastly a new system of supplying ammunition in the field was tested, small carts carrying twenty cartridges per rifle accompanying the men.

#### NEW CANET FIELD GUN.

The principal modification introduced by M. Canet in this gun is that the trail is itself a break, which minimizes the shock caused by the running back or recoil of the gun. This trail is composed of two concentric tubes of hammered steel, which are able to penetrate or envelop each other reciprocally during the recoil. The first tube which is joined to the carriage is the largest, the second forms a piston, terminated at its lower end by an inclined or sloping spade which, as it penetrates the earth, creates the fixed point necessary for the piece to be brought into action. This second tube also contains the hydro-pneumatic break. As the gun is fired the spade digs itself into the soil, the movable part is driven back, and telescoping on towards the breech, works the hydro-pneumatic break. As soon as the force of the recoil is deadened, the air which has for a moment been compressed, regains its elasticity, and the gun automatically resumes exactly the same position which it occupied before discharge. In case of change of

aim, to turn the gun in another direction one has only to lift up the spade, which by the fact of the heaping up of earth caused by the shock of recoil is in itself disengaged and no longer sticks in the ground. So that thus is saved the great loss of time which gunners forcibly had to put up with whilst the gun was being run up and re-aimed after each discharge.

In appearance this gun somewhat resembles our breech-loading 13 pdr. field gun, but, the trail being cylindrical and telescopic, resembles another gun with breech under the real gun and muzzle to rear. The head of the spade is covered with a sort of platform, in shape like a skate's back, on which the trail rests. The platform itself—which before the gun is fired is raised some 8 in. off the ground by the spade attached to it at an angle of about 45 deg.—sinks on to the ground itself as the spade becomes embedded after the discharge. Thus the trail of the gun after firing looks, and is indeed, fixed to the ground, in the same manner as the tripod legs of a quick-firer are bolted down to the deck on a man of war. Four horses, with two drivers, draw the field piece; the draught is pole draught; the sabres of the drivers are attached to the saddles.—*Army and Navy Gazette*.

#### STATISTICS OF 1870-71.

The German papers publish statistics respecting the number of German soldiers wounded in the war of 1870-71. The total is given at 116,821. Almost 96,000 men survived, but the greater portion of them were practically unfitted for the every-day warfare of existence. The statistics as to the various kinds of wounds received are suggestive. Most of those caused by bullets were in the head or the chest and back, and amounted in the head alone to 11,041 and in the latter to 11,495. The wounds by rifle bullets more than doubled those caused by artillery, but more curious figures are those concerning sabre cuts. Only fifteen out of 2000 injuries to the face were traceable to the sabre, and it would seem, therefore, that cavalry charges are the least deadly of any of the methods of war, merely dispersing or disorganizing the enemy rather than killing them. The jawbone, again, seems to have a special attractiveness for rifle shots. Injuries to the jaw appear to be so numerous in war as to verge on the phenomenal. They are nearly always serious; a large proportion ultimately prove to be fatal. Those people who recover seldom do so entirely. Speech is often taken away wholly, or the power to eat, or the ability to masticate the simplest of food. Almost 50,000 injuries on the German side were in the lower extremities, mainly resulting from bursting shells, cannon balls, and rifle shots; but it is next to impossible to obtain trustworthy statistics on this head.

#### TEST OF SEARCH LIGHTS.

With the object of applying a practical test to the value of search-lights as a protection to the entrances to Plymouth Sound, a series of experiments have lately been carried out in which the military forces had the assistance of the torpedo flotilla attached to the port. For some time past the officers connected with the Submarine Mining Establishment of the Royal Engineers at Elphinstone Barracks, Plymouth, have been giving their attention to the distribution of a system of electric lights arranged so as to cover

the two approaches to the port of Plymouth and the entrance to the Hamoaze. Previous to these experiments no actual test of the scheme had taken place, and it is hoped to obtain some reliable data as to the efficient working of the scheme, and also whether it is capable of being improved. Owing to the experiments and arrangements connected therewith being confidential, it is impossible to give any official details; but from observation and other sources a good deal has been gathered with reference to the experiments, to which considerable importance is attached. The torpedo-boat destroyers *Skate*, *Ferret*, *Lynx*, *Opossum*, and *Sunfish* left Devonport about 4.30 P. M. for Plymouth Sound, with the object of returning to the harbor by passing through the areas defended by two of the powerful lights at Picklecombe and Garden Battery under Mount Edgcumbe. The Royal Engineers and Royal Artillery furnished observers at Drake's Island, the Breakwater Fort, Penlee Point, the Redoubt, Maker, Rovisand, Staddon, and some of the other defenses, for the purpose of taking rapid and accurate observations of the movements of the torpedo-boats. The experiments the first night were limited to the western entrance of the sound and harbor, and witnessed from a good point of vantage they were to all appearances most successful. The lights at Garden Battery commanded the whole of the waters of the sound as far as Drake's Island, and notwithstanding the weather was of the worst description for experiments of this kind, it was possible from the shore to discern small objects afloat. As the destroyers came within range of the defined area they were at first only faintly visible, but as they approached the fierce light which beat upon them from the Garden Battery, they were distinctly seen from stem to stern, and in actual warfare no difficulty would have been experienced in disabling them from one or more of the numerous defenses guarding the western side of the fortress. In continuation of the recent experiments at Plymouth, a trial on a smaller scale was also made at the Needles, when the destroyers *Daring* and *Starfish* were employed, with instructions to rush past the Cliff End batteries on the Isle of Wight side and the Hurst Castle fortifications on the mainland, the channel being little more than half-a-mile wide. So strong was the glare of the light that for a distance of three or four miles the look-out was practically blinded, and it was only by intimate knowledge of the locality that it was possible to steer the vessels past buoys and other obstructions. The vessels were under orders to first pass the lights, and then to make a dash on Portsmouth, the gunners in the forts opening fire on the boats the moment they came within observation. The *Daring* shot past the forts unobserved, and the artillery officer in command has since inquired how it was done, as the *Starfish* was under fire for three minutes and three-quarters. Now in going out to sea the vessels steamed at 18 knots, four cables apart, and, assuming they adhered to this formation, there would have been no difficulty in detecting them; but the moment the *Daring* got outside the Needles she covered all her scuttle lights, extinguished her bow lights, and put on full speed, so that she passed the forts before she was expected, and, having no lights, eluded suspicion. The experiment, small in itself, is not without importance. If the raiding boat is only to make a rush at the moment she is expected there is small



chance of her success; but in this instance, by putting out her lights and anticipating expectation by a few minutes, the *Daring* evaded the watch. It is uncomfortable to think that the *Daring* did precisely what an enemy would do, and that she was successful.—*The Times* and *Naval and Military Record*.

#### THE NEW WATERPROOFING SYSTEM.

The War Office awaits the result of the experiments which are being carried out practically in South Africa to test the merit of the new waterproofing system of which a good deal has been heard lately. The British Millerain Company have supplied 30,000 blankets to the troops in Rhodesia, in addition to millerained serges and greatcoats. The advantage claimed for the millerained system is that all material treated under this patent process retains its porosity and yet is impervious to moisture. A blanket, for instance, can be used as a bucket to carry water, while the heaviest rain runs off "millerained" khaki and canvas, scarcely damping the surface. It may be possible, if the reports from South Africa are favorable, to dispense altogether with waterproof sheets, which are a heavy item of expense.—*Army and Navy Gazette*.

# Comment and Criticism.

## I.

### "Proper Military Instruction."

Major A. L. Wagner, A. A. G.

THOUGH the readers of the JOURNAL OF THE MILITARY SERVICE INSTITUTION may not always be prepared to applaud the logic or accept the theories of a prize-essayist, they do at least expect to find in a paper which has received the honor of the gold medal the plain merit of accuracy and fairness; and I regret to say that, so far as it relates to the Infantry and Cavalry School, this expectation is disappointed in the essay now under consideration. Space will not permit a discussion here of all portions of this remarkable paper; and, indeed, a rectification of the mistakes of its author in regard to the Fort Leavenworth School will occupy all the space that could reasonably be asked by a single reviewer.

When the essayist begins his remarks about the school with the statement that "through the devotion and ability of its superintendents and instructors it has reached a high state of efficiency," and then proceeds to attempt to demonstrate that the system and curriculum are all wrong, and that the officers on duty at that institution have failed to grasp its true objects or to conduct it properly, the inconsistency is calculated to cause amusement or to provoke indignation according to the mood of the reader; but in either case the emotion is coupled with amazement that a paper containing so much error could receive the approval of a board of award.

The essayist seems unwilling to include the Infantry and Cavalry School among our post-graduate schools; for he says, "We have such schools for the engineers and artillery, and all officers of these arms are required to attend them. We have excellent service schools for the infantry and cavalry"; and again he remarks of the Infantry and Cavalry School, "It is not wholly a post-graduate school, as many of the student officers have been promoted from the ranks or appointed from civil life." If we regard a post graduate school as one limited solely to the instruction of graduates of the Military Academy, the Infantry and Cavalry School does not merit that title; but then neither does the Artillery School, for its alumni are not all West Pointers, and in its list of honor graduates can be found the name of at least one officer who was appointed from civil life. If the term be applied, as it should properly be, to an institution whose curriculum is an extension of the course at the original school, then the Fort Leavenworth School does deserve the title; for, with the exception of the course in law, and a very small portion of the course in engineering, it is an extension, an amplification, and (so far as infantry and cavalry are concerned) a completion of the West Point course. An examination of the text-books and present methods employed at Fort Leavenworth in connection with those in use at West Point will make this clear to any one who cares to investigate the matter.

Captain Pettit finds the information conveyed by paragraph 33 of the Programme of Instruction "astonishing," because practical exercises do not have as high a value as he would give them relatively to theoretical instruction, and because the Departments of Infantry and Cavalry are not given a preëminence among the departments of the school. Let us examine into the matter, and see how far his astonishment is justifiable.

The objection to the low rating of the Departments of Infantry and Cavalry is evidently based upon the assumption that they should include the subject of minor tactics, and that that important branch of military instruction, not being found in those departments, is held in slight esteem, or ignored altogether, at the Infantry and Cavalry School.

It so happens, however, that an extended course, not only theoretical but *practical*, in minor tactics is given in the Department of Military Art, which fact should have been known by the essayist, as he has evidently had access to the programme of instruction. The subject of minor tactics has not been assigned to the Department of Military Art without good cause. In the Departments of Infantry or Cavalry instruction could be given in the minor tactics of the arm pertaining to that department; but to which department should the subject be assigned when it includes the three arms combined? What justification would there be in giving precedence to either department over the other? In the course in military art instruction includes the minor tactics of each arm, and of the arms combined, both arms being on a perfect equality, and the practical exercises following or accompanying the theoretical instruction given in the same department. Nothing could possibly be gained by a transfer of the subject of minor tactics to the Departments of Infantry and Cavalry; and when the essayist would elevate those departments to the chief rank in the school, it is evident that he does not appreciate the existing conditions, and that he is influenced by names rather than facts. He says, "Fortification, topography, signalling and photography, are adjuncts to a military education, but we cannot for a moment admit that they are even equal in importance to the training and instruction of the young officer in the minor tactics, administration, and discipline of his own arm." Now, so far as I am able to learn, nobody admits that they are equal in importance, or wants to admit it. The essayist's supposition that they are held in equal importance at the school is based evidently upon his failure to observe that the subjects of minor tactics and administration are included in the Department of Military Art, and that the student is presumed to have been instructed in "the discipline of his own arm" before he is detailed for duty at the school.

Now when we consider what the courses in the Departments of Infantry and Cavalry really embrace, and consider that the course in engineering comprises not only the "adjuncts" of fortification, signalling, and photography, but the subject of topography as well, the relative values assigned to the departments does not seem to be at all in need of rectification. These "adjuncts" are not all to be despised. Captain Pettit must surely understand the incalculable value of the study of military topography as affording a means of acquiring a knowledge of the terrain in military operations; and as to the importance of such knowledge, he is respectfully referred to his own essay on "The Terrain in its Relations to Military Operations" for which he received honorable mention in 1892. In that essay he quotes the views of Nigote, Lewal, Guichard, and Von Scherff in regard to the importance of the study of the terrain, and asserts that "to this testimony we may add that of every modern military writer of note." He himself declares that it is the "primer in the education of our troops for war"; that "the great importance of practical and theoretical study of the terrain can not be too strongly impressed on officers and men of every grade and every arm of the service," and that "it is an indispensable part of the training of every professional soldier worthy of the name." How does it happen that this great subject has now become a mere "adjunct" to be regarded so lightly?

"During the first year," says Captain Pettit, "the infantry officer should be instructed theoretically and practically in the principles of combat, advance and rear-guards, outposts, patrols, drill regulations, marches, escorts, reconnaissance, administration, fire tactics and fire discipline,—for infantry alone. Beginning with the squad he should progress to the battalion." The inference to be drawn from the above is that the subjects enumerated are not taught at the school. In point of fact, every feature of instruction enumerated above has been taught at Fort Leavenworth for some years in an extended *practical* course, as Captain Pettit could easily have ascertained if he had taken the trouble to consult the reports of the several commandants, or to inform himself in regard to the institution before turning on his flood of criticism. In one respect, however, the course differs from that suggested by Captain Pettit. He declares that the practical work should begin with the squad and progress to the battalion. Now, right here, he has failed utterly to

grasp the fundamental object of the Infantry and Cavalry School, namely, *to give instruction in those subjects which cannot be learned with equal facility or equal thoroughness at ordinary posts.* Captain Pettit recommends that every second lieutenant have two years' duty with his regiment before he be sent to the special school for his arm of the service, and at present the average length of service of the student officers greatly exceeds this. Provision is made for the instruction of lieutenants at their posts by paragraphs 185 and 252, Infantry Drill Regulations. Is it to be supposed that the instructors at an ordinary garrison are so incompetent, or that the second lieutenants are so stupid, that after two years of regimental service, subalterns must be sent to a special school to receive instruction in the drill or the tactical handling of a squad? What justification could be found for an expenditure of public money in maintaining a school for the instruction of officers in duties which they are, and should be, expected to know thoroughly as an incident of their regimental training? In the exercises in both drill and tactics, the students at Fort Leavenworth are given practical instruction in the duties of all the grades from second lieutenant to battalion, squadron, or regimental commander, but the school is not maintained for the purposes of squad drill.

Captain Pettit would have a similar course for cavalry officers "with the addition of equitation and hippology." The entire course which he prescribes, including hippology, is now given to all students at Leavenworth, both infantry and cavalry. The authorities at the Infantry and Cavalry School have never yet seen any reason to limit cavalry instruction to cavalry officers, nor can any reason be found for so doing, unless we assume either that infantry officers do not need a knowledge of cavalry duties or else that they are incapable of acquiring it. As to the first assumption, Captain Pettit himself says in his essay: "Our military policy demands that our officers be instructed for duty in all arms of the line. Sheridan was in the infantry when the war opened; Howard was in the ordnance, McPherson was an engineer. If war should come upon us now we should have to increase our cavalry and our field artillery. We should need trained officers for them at once, and would have to draw them from the infantry, as we could fill vacancies in that arm more acceptably. An officer in our army can hardly foresee the nature of his service in time of war; his training must therefore be broad and extensive"; and again, "Our military policy demands the general preparation of all officers for any service it may be convenient to assign to them." As to the latter assumption it is sufficient to say that infantry officers have twice headed the class in cavalry instruction, and that at the last examination a second lieutenant of infantry passed highest in the practical work of the Department of Cavalry. As to instruction in equitation, it is not deemed necessary for cavalry officers of two years' service, and of the infantry officers very few indeed have any need of this instruction when they arrive at the school. It should be emphasized that the students at the Infantry and Cavalry School are neither boys nor recruits, and that the instructors have other work than that of drill-sergeants.

The comments of the essayist on the detailed programme of instruction in the Department of Military Art, if not made ignorantly, must be characterized as unfair, to use the mildest term applicable in the case. The sub-divisions which he enumerates so prominently are merely explanatory sub-heads, similar to those which indicate the contents of a book, and are no indication of the relative amount of time given, or the relative importance attached, to the different subjects. It was not supposed that any intelligent officer would infer from these sub-heads that because strategy has twenty-four sub-divisions, and the exercises with and without troops only three, that more time was necessarily, or even probably, devoted to the former than to the latter. As well might we conclude that because a little book on "The Elements of Military Science" has twelve chapters and Jomini's "Art of War" only seven, that the former is a larger and more important work than the latter.

Speaking of the exercises without troops, it is a pity that the essayist did not take the trouble to investigate that branch of instruction at Fort Leavenworth. He would have



learned that the scheme which he sets forth on p. 48 of his essay has been in use at the school for some years, though the maps employed have shown a less fantastic topography than the one with which he illustrates his theme.

The essayist says: "If this course is thoroughly taught there will not be much time for individual training in infantry and cavalry, and the name of the school should be changed to War College, and it should be opened to officers of all arms." I am satisfied that the instruction is as thorough as that at West Point or Yale, and I am equally satisfied that there *is* time for all the individual training in infantry and cavalry that could properly be made a part of the course of instruction at the school. As to changing the name of the school to War College, I do not think that would be at all objectionable. The name of the school is a matter of slight importance. "A rose by any other name would smell as sweet." Those who have shaped the policy of the Infantry and Cavalry School have sought to make it an institution of value to the army and the nation. If in aiming to attain this end, they have found other departments more valuable than those bearing the distinctive appellation of infantry and cavalry, it does not follow that any harm has been done by giving the highest rating to the most important departments. If, as a result, the institution should, in the interests of consistency be called a War College, well and good. By all means let us change the name, if only to please captious critics, and to encourage them when they show a disposition to be consistent.

"It is," says Captain Pettit, "the old West Point idea that in case of war we are all to be generals; consequently, strategy, grand tactics and logistics usurp the time and labor which rationally belong to the company and the battalion. We do not seem to be able to overcome a desire to begin at the top instead of the bottom." The essayist has here fallen into an error as complete as it is inexcusable. "Strategy, grand tactics, and logistics" do *not* "usurp the time and labor which rationally belong to the company and battalion." The course in strategy, logistics, military history and military geography, is all comprised within the last seven months of the course in military art. The rest of the time is devoted to theoretical and practical instruction in tactics.

Now, as to this "old West Point idea," let us look into it a moment. I touch upon the subject of West Point with diffidence, for it is nearly twenty-two years since I was graduated at that institution, it is some years since I last visited it, and I do not wish to indulge in criticism of an institution of whose present condition I may not be correctly informed. If, however, the text-book on the Art of War now in use there be any criterion, the "old West Point idea" must have undergone a change, for out of 293 pages, I find only 21 devoted to strategy, and 25 to logistics. The rest of the book is devoted mainly to tactics. In Captain Pettit's little book on "The Elements of Military Science," which contains only 199 pages, and is intended for the use of school-boys, I find 15 pages devoted to strategy and 18 to logistics. A simple calculation will show that the essayist seems to be more deeply imbued with the "old West Point idea" than the good people are at West Point. Moreover, in the scheme which he proposes as a model for lyceum instruction the greater part of the "work for the evening" relates to the duties of the commander of the advance guard of an army corps, who, under the given circumstances, would be a brigadier general at least. Verily, "We do not seem to be able to overcome a desire to begin at the top instead of the bottom."

In commenting on the course at the Infantry and Cavalry School, the essayist says: "The tendency of an elaborate system of theoretical instruction is to make war appear complicated and abstruse; and to divert the attention of the student from his present rank and duties to an idle contemplation of the remote possibilities of the future." Now the tendency at the Leavenworth school is not to divert the attention of the student from his present rank and duties to an *idle* contemplation of anything. The course is not an "elaborate system of theoretical instruction," though theory is not placed in the same category with anarchy, the bubonic plague, and other things hurtful to the usefulness or happiness of man. Rational

practical instruction must be based on sound theory ; and it may be remarked that the only people whose conduct is not based upon theory of some kind are found in asylums for the feeble minded. Moreover, it is not regarded as either criminal or absurd to encourage a young officer to keep in view the possibility that he may some day be a general and that he may then possibly profit by a previous study of the experience of other commanders. The essayist says : “ We need go no further than the War of the Rebellion for ample proof that soldiers are frequently born and rise to eminence through inherent qualities, and without the advantage of previous military instruction.” This is very true, and the members of the board of award are themselves conspicuous proofs of the correctness of the statement ; but nobody knows better than Captain Pettit that in that conflict all the pre-eminent generals were men who had had the advantages of previous military education. Military science is not unlike other sciences. Occasionally a man achieves fame and distinction as a *savant* who never went to college. But, because Franklin and the elder Herschel were eminent in the world of science, we would scarcely be justified in seeking philosophers among truant printers’ devils or illustrious astronomers among deserters from military bands. There have been, and are, distinguished generals who did not receive a military education—and the more deserved is their fame—but they constitute exceptions which merely serve to emphasize the general rule.

But Captain Pettit is not altogether opposed to theoretical instruction, for he says : “ Theoretical instruction should be given, first in those things which can be fastened in the mind by practical application. The extra time can then be wisely devoted to military history, the art of war, tactical problems on the map, war games, staff duties, and essays on military topics assigned by the instructor.” It so happens that all this *is* done at Fort Leavenworth, as Captain Pettit could easily have ascertained had he taken the trouble to do so. Theoretical instruction is first given in the different features of tactics, and a practical application of the theory is then made as far as possible *pari passu* with the lessons.

In speaking of the Fort Riley school, the essayist says : “ It is also fortunate that its rational place in our system has steadily been kept in view, and that it has not been enticed into the mazes of text-book instruction, but has remained what it should be—a practical school.” Captain Pettit evidently does not know that at Fort Riley the same books on tactics are studied that are used at Fort Leavenworth, and that theoretical instruction in the form of recitations is given. It is not so surprising that he should not know that the *practical* exercises at Fort Leavenworth last year were at least equal in number and scope to similar exercises at Fort Riley, for that fact does not seem to be generally known. It is nevertheless true, and might have been ascertained by the gold medalist had he done the Infantry and Cavalry School the justice of learning something about it before undertaking to criticise it.

In his comments upon the Military Academy, Captain Pettit says : “ Very great care and wisdom must be used in determining the quantity and quality of the practical work, glibly talked about, but little understood by critics of the Academy. We must ‘make haste slowly.’ The able men who have the matter in charge are fully competent to arrange it for our best interests.” It is a pity that he cannot place equal confidence in those who have the matter in charge at Fort Leavenworth, when he criticises that work so glibly. But as such confidence is evidently lacking, let us examine the matter and see how far the Infantry and Cavalry School deserves the essayist’s suggestion that its work is not sufficiently practical. Let us first emphasize the fact that the school is not maintained for the purpose of giving instruction in ordinary drill which every subaltern can reasonably be expected to learn at his post. The practical instruction in tactics, is therefore, of a nature such as to make it a continuation and an enlargement of the instruction received by the student before entering the school. The nature of the practical exercises is thus described in the last annual report of the instructor in Military Art :

“The benefit derived from such exercises can hardly be overestimated, and those at

the Infantry and Cavalry Schools have a peculiar value, which is perhaps not generally recognized. At the time set apart for these exercises, the troops of the garrison, in numbers suitable to the nature of the exercise, are turned over to the instructor in Military Art, and are officered entirely from the class of students. As a result, a subaltern who, in the course of his regimental duty may never have had command of any body of troops larger than a platoon, finds himself in command of a regiment of infantry, a squadron of cavalry, or both, not merely to put them through a regulation close-order drill, but to march them, encamp them, prepare them for attack, make dispositions for defense, etc., and in every case to act promptly in accordance with varying conditions and the nature of the terrain. These exercises are well calculated to develop a young officer's self-reliance and confidence, more than any amount of ordinary garrison service. The peculiar advantage possessed by the Infantry and Cavalry School in this respect, lies in the fact that it is the only place where a large command and a full complement of young officers can be combined."

Captain Pettit's caution "to make haste slowly" in regard to the practical work of various kinds at the Military Academy should be extended, so far as practical exercises with troops are concerned, to all parts of the service. The value of these exercises is not in proportion to the amount of noise made or the volume of smoke and dust raised, but in proportion to the verisimilitude to actual warfare which they present. They must be in accordance with a well-digested scheme if they are not to degenerate into sham-battle nonsense positively pernicious in its effects. The number of practical exercises at Fort Leavenworth is constantly growing, being larger for each class than it was for the one immediately preceding. As the course is extended its proportionate rating is increased, but the practical exercises cannot be made to cover all but the winter months as Captain Pettit advises. The question of the necessary troops is evidently one that he has not considered. As the name implies, "exercises with troops" require troops, and even a great portion of the "exercises without troops" require horses, which have to be furnished by the cavalry. It so happens that the 20th Infantry and the squadron of the 6th Cavalry which constitute the garrison of Fort Leavenworth are not excused from anything that is required of any other troops in the army. They have their drills, their tactical exercises, their target practice, their thousand-and-one details of garrison instruction, and they cannot be constantly at the disposal of the school. It may be asked, Why not assign the students to the different companies and troops as supernumerary officers? To this it can be replied that the system of assigning student officers to the companies and troops of the garrison was thoroughly tried in the early days of the school and found wanting, and the interests of the post as well as of the school have been subserved by its discontinuance. It is a fact, of which Captain Pettit seems to be ignorant, that the Infantry and Cavalry School and the garrison of Fort Leavenworth are with the exception of having a common commanding officer and the garrison troops being available in the school "exercises with troops," as completely separate as though one were in Florida and the other in Alaska.

For theoretical work, Captain Pettit would divide the class into two sections; "one section to contain graduates of the Military Academy who have once been declared proficient in law, ordnance and gunnery, drawing, civil and military engineering; the other to contain officers who have had no theoretical instruction in those subjects. It is not possible to put both sections through the same course and do justice to both; either one will be unjustly retarded, or the other unduly advanced. To relieve the school from this difficulty, officers appointed from the ranks or from civil life should report one year sooner than the other members of the class to be taught the subjects mentioned above." The essayist here makes the mistake of supposing that the course in military engineering is the same as the one at the Military Academy, which it is not; also that there is at Fort Leavenworth a course in civil engineering, which there is not. In regard to dividing the class into two sections he is a decade behind the times. The class was formerly so divided—not into graduates and non-graduates of West Point, but according to educational attainments of the members,

some officers from civil life or the ranks being well qualified for taking any course laid out for graduates of the Military Academy. The real progress of the school dates from the time when this system was abandoned. The plan of having officers who were not possessed of a West Point education or its equivalent report six months earlier than the other members of the class was tried and abandoned, partly for want of quarters for the additional officers, but mainly because the results were not commensurate with the expense and trouble.

"During the second year," says Captain Pettit, "the practical work should be a continuation of the work of the first year, practical field engineering, combinations of the arms in minor tactics, infantry and cavalry, infantry and light artillery, cavalry and light artillery." With the exception of the work involving light artillery, all this is now done at the school and has been for several years. That artillery has not been included is no fault of the commandant or instructors.

In fact, Captain Pettit's knowledge of the Infantry and Cavalry School is so meagre that it scarcely deserves the poor compliment of being termed superficial. He says: "We have become so infatuated with the marking idea as to carry it into our post-graduate schools, and we have seen the sad spectacle of a war veteran competing, on a scale of three, with a 'youngster' just out of the Academy." Now, in point of fact, recitation marks are unknown at Fort Leavenworth, having been abandoned nearly two years ago. The essayist could have learned this from the last report of the Commandant of the Infantry and Cavalry School had he been so inclined. The only marks now given are in the practical work, in which each exercise is regarded as a part of the examination. Everything else is determined by the result of the examination.

Captain Pettit says in regard to the instructors: "All of our schools have suffered severely through the lack of good instructors. An order to instruct has been deemed all that was necessary to make an instructor; consequently the school has had to instruct both student and instructor. The text-book which could be closely watched became of necessity the boon companion of the instructor, and the system became dogmatic, uninteresting, and irksome to the last degree. In some cases the instructor brought less experience and but little more knowledge into the section room than some of his pupils; he could not possibly exert any beneficial influence over them, and necessarily retarded the progress of the school." This might seem to be intended to refer "to all of our schools," but as it appears under the caption of the Infantry and Cavalry School, it is evidently calculated to apply especially to that institution. If it were correct, it might be pardonable notwithstanding its severity; but it is both wildly incorrect and inexcusably unjust. In the early days of the school, the instructors were chosen from the garrison, and, whether satisfactory or the reverse, they represented the best personnel available. But all this has been changed. The instructors are no longer drawn from the post, but are appointed by the commanding general on the recommendation of the commandant of the school. That they are all perfect nobody claims, for a man may be an excellent officer and still be lacking in the pedagogic faculty; but it can be claimed for all that they are earnest and conscientious, and their qualifications can best be found in their records. Of the fifteen officers serving as instructors and assistant instructors twelve are graduates of West Point, and of this number six are graduates of the Infantry and Cavalry School selected for their special fitness as demonstrated in their careers as students. As to the instructors in infantry, cavalry, and hygiene, their character and qualifications need no defense from the careless remarks of the essayist. I say advisedly that the instructors and assistant instructors at Fort Leavenworth have for some years been selected with at least as great care as has been evinced in the selection of instructors at West Point. Even in the crudest days of the school no instructor in drawing ever perpetrated the topographical enormity of a sketch in which the streams violate the law of gravity and hold contours in contempt. I regret the same cannot be claimed for all the ex-instructors of drawing at the Military Academy.



The gold medalist says, "Practical work, zeal, simplicity and individuality should count three points as against one for knowledge of the book. Now the practical work alone is already assigned a value much greater than that given to the same amount of theoretical work, and all *possible* time is assigned to the former. As to "zeal, simplicity, and individuality," nobody at the school doubts the value of those qualities, and nobody desires to hold them in anything but the highest esteem, either positively or relatively; but how are they to be noted, reported upon, and recorded? Is it always possible to avoid error in "sizing up" a bustling sham or an earnest man whose zeal is concealed under an apparently apathetic manner? Is not apparent simplicity often a mask, and is individuality always evident? I have no hesitation in saying that if the attempt were made to form an estimate of the positive or relative merits of students based upon these valuable qualities, the greatest mistakes and the grossest injustice would be done. We might as well endeavor to form an estimate of relative merit based upon clearness of conscience or loftiness of soul on the part of the students, and imagine that hypocrisy would always be detected, and virtue ever be self-evident.

Perhaps the most amazing passage in the essay is the following: "A cavalry officer poor in horsemanship, slow in action, or lacking the physical and mental qualities that give energy and enthusiasm, should be recommended by the staff for transfer to the infantry." I can scarcely believe that this is not a typographical error. Is it possible that Captain Pettit entertains such a contemptuous opinion of his own arm? A man poor in horsemanship might, it is true, be a very poor cavalry officer and yet do excellent service in infantry; but if he be slow in action, or lacking the physical and mental qualities that give energy and enthusiasm, he will be utterly worthless in the infantry. Such officers did not lead Pickett's men up to the Union lines at Gettysburg, nor did men thus lacking make a lodgment in Lee's works at the "Bloody Angle." Such a transfer would, perhaps, have been proper in the Middle Ages, when the cavalry was an *élite* corps and the infantry a mere rabble, but it will not do in the present day. In his ideas in regard to the qualities requisite for officers of his own arm, Captain Pettit is fully six centuries behind the times.

"The sentiment of the service," says the essayist, "for the Leavenworth School will be more kind, details to it will be more eagerly sought, and the antagonistic feeling so common to students which makes good instruction impossible, may be overcome when it is put in rational accord with the object of its existence." I contend that the Infantry and Cavalry School is in rational accord with the object of its existence, and that this would have been evident to Captain Pettit had he taken the trouble to ascertain the true facts in regard to the institution. As to the sentiment in the service in regard to the Infantry and Cavalry School, I know that in the main it is both kind and appreciative, though the school is doubtless held in slight esteem by the three following classes: 1. Ultra-conservative relics of the past, who dislike it because it represents something new; 2. Men who, owing to their own mental deficiencies or moral shortcomings, have been sent away from the school without a diploma, and who shield their wounded vanity behind an assumed contempt for the institution which found them unworthy; 3. Thoughtless officers who, without making use of their own intellect or powers of observation, accept without reflection the assertions of the two former classes.

If Captain Pettit were gravely to recommend that our infantry be armed with breech-loading rifles, and were to base such superfluous advice upon the ground that during the Mexican War the American infantry had the muzzle-loading, flint-lock musket, the absurdity would differ in degree but not in kind from that of his remarks about the Infantry and Cavalry School.

In conclusion the essayist says: "The Leavenworth School is an important link in our chain of instruction. Its influence reaches deeply into two great arms of the service; in a few years its graduates will attain rank and command; how essential is it that its in-

structors shall grasp the spirit and methods of the new instruction, which places discipline, loyalty, zeal, determination to conquer and self-confidence first; daily training in all of the details and duties of one's own arm, second; and last, such accessories as may be considered necessary as preparation for high command, or for adding to the accomplishments and general usefulness of the officer." It has not occurred, perhaps, to the essayist that the officers on duty at the Infantry and Cavalry School have studied and carefully reflected upon the new methods of military instruction. They assume, however, that the student-officers are not school-boys, and that long before they are detailed for instruction at Fort Leavenworth their ideas of "loyalty, zeal, determination to conquer and self-confidence," have been carefully fixed. They assume also that the routine duties and details of the student's own arm have been correctly taught him in his own company and regiment; and they are firmly imbued with the idea that the true object of the school is to give instruction in those features of military education essential to line officers which cannot be taught with equal facility or equal thoroughness at ordinary posts.

### First Lieut. Stephen M. Foote, 4th Artillery.

I am quite sure that Captain Pettit's ideas of proper military instruction will, in the main, be heartily endorsed by our officers. Not all change is progress by any means, but the changes suggested by Captain Pettit seem, for the most part, in the line of progress. Certainly his remarks about the relative amounts of time given to mathematics and the languages will strike a responsive chord in the breasts of most graduates of the Academy. But concerning the practical change that he suggests, has he not fallen into an error? He says we do not need more time for mathematics than is given at technical schools. Is that so, under present conditions? Is it not true that we do need more time—not in order to know more mathematics, but in order know as much? And here we come back to the same old subject, the difference between the entrance examinations at West Point and the technical schools. A good part of the first year is given up to teaching cadets what students at technical schools are required to know at entrance. With all the time now given to pure mathematics at the Academy cadets do not know any more of the subject than is essential to the proper pursuit of the sciences as taught in the rest of the course. I don't believe any one would wish to lower the standard of *thoroughness* which is the best and most distinctive attribute of a West Point education, or to take anything from the course in the sciences. So it is not easy to see how, until a change is made in the entrance examinations, any time can be taken from mathematics and given to languages.

With regard to the foreign languages, it seems to me a change for the better might be made within the time now at our disposal. And first let us consider for a moment why our officers should study foreign languages at all:

1. A large proportion of articles and military subjects are printed in French or German. While it is not necessary that officers in general should read these in the original, it is necessary that some should be able to do so and should translate the best of them for publication in our service journals.

2. While it is not necessary that officers in general should be able to speak two or three foreign languages, it is necessary that there should be some officers who could be called upon to visit foreign nations, foreign vessels in our harbors, foreign visitors to our country, and perhaps foreign enemies. These officers should be able to speak the foreign language, to understand and be understood. It will be objected that such service will be comparatively rare. True, but most important when it is required, especially in time of war. The time taken up in learning to speak a language is not taken away from the time given for learning to read it, but on the contrary, speaking a language is one of the aids to reading it understandingly. As a matter of fact it is impossible to read a modern language with a thorough understanding without an acquaintance with the living spoken language.

- 1, for one, should dislike to see Spanish dropped out of the course. I believe and

hope that the time is soon coming when we shall have much closer relations with Spanish America. Our foreign policy has been looking more and more that way for the past seven or eight years. Of course not much can be done with Spanish in the time now given to it, and the introduction of German as proposed would oust it altogether, and would probably result in an even division between French and German of the time now given to foreign languages, without a sufficient time being given to either.

Now, what I would suggest is this: Divide the class into three parts. Let one part study French, another German, another Spanish. Each cadet could then give all the time to one language that he now has for two, and with proper instructors, could get a fair working knowledge of it—I mean such a knowledge that he would be able to talk it, write it and understand it when spoken, as well as to read it. In dividing the class perhaps the divisions need not be equal. Perhaps cadets might be allowed to elect, to a certain extent at least, which language they would prefer. A half hour of the time now devoted to studying each lesson might be taken up in conversation in the section-room with the instructor. Topics of interest to cadets and pertaining to the lesson of the day would readily suggest themselves. Doubtless for a few years there would be some difficulty in securing qualified instructors among officers of the army, but that is a difficulty that could be overcome and would rapidly grow less. We should soon have plenty of officers able to do all that is suggested above as necessary, or at least desirable, in the use of foreign languages. Each graduate would be able to speak some one foreign language and would be able to read it better than cadets now learn to read French—and all without adding to the time now given to the subject.

#### First Lieut. Matthew F. Steele, 8th Cavalry.

Captain Pettit's prize essay is so full of good notions and excellent suggestions that one can hope it may be read and pondered by every officer in the service, but especially by those high in rank, authority or influence. Its main strength lies in its quality of being practical. It does not base its suggestions upon acts of congress, those *ignes fatui* of the hopeful; it takes the service as it finds it to-day. And it is optimistic; it does not spend itself in complaining of our present condition, but recommends ways of improvement for hereafter.

His recommendations for the conduct of our lyceums, our examinations for promotion and our service schools, are entirely novel, and I suppose original, and, if adopted, they would work immense improvement in these matters, and place them beyond the scoff of any officer, no matter how old and ignorant, nor how young and wise.

Among so many good things in an essay, one can find almost nothing to criticise and very little to oppose. He says (p. 14) "Infantry and cavalry officers have but little use for mathematics." Does he not ignore the fact that the principal use our country colleges make of the officers detailed as their professors of military science, is in the department of mathematics? Does he wish us to let all these college plums go to the artillery? And what part of the course in mathematics would he omit? Reformers are too given to telling us what we ought not have, without telling us what we ought to have.

I cannot quite see, either from the writer's argument or my own limited experience, why he attaches so little value to the study of Spanish, or why he should wish it replaced by German in the curriculum of the Military Academy. The dogma he lays down is "that the study of foreign languages can be approved only on the ground of utility." It must be remembered that Spanish is the language spoken by all the peoples of the American continent, except the Brazilians, south of the United States; and in view of the "reciprocity" and commerce our statesmen are promising from year to year, to say nothing of the possibilities of the Monroe Doctrine, it should seem that Spanish might be of some use to an American officer. "One can travel," writes Captain Pettit, "around the world quite comfortably without knowledge of any language but English." Perhaps so, in railway coaches

and steamers, but I suspect he never travelled "comfortably" on foot or horse-back into the interior of Mexico, if, indeed, along our own Mexican border, without some knowledge of Spanish. Did any one ever meet a "Greaser" that could tell him anything about a distance, a direction, a ford or anything else, except "No entiendo inglés"; "¿ Qui'n sabe?" "No entiendo nada"; or "P'allá"?—and the last expression meant any distance from five feet to a hundred leagues, according to the intonation and the length of drawl.

The essayist takes the view that only a "reading knowledge" of a foreign language can be acquired in the time allotted to it at the Academy. Some eminent linguists, like Professor Rosenthal, have a quite contrary opinion, and many of us who have tried both incline to agree with Professor Rosenthal. Captain Pettit also thinks that is all the knowledge of a foreign language we need. In these days any German or French book worth translating into English is sure to find a translator; and for my part, I would sooner trust the expert to give me the fine shades of the French author's meaning,—the sense of his untranslatable idioms,—than depend upon my reading knowledge of the language. And through our service journals we may safely count upon getting the best professional literature of the French and the German magazines, because our editors will be supplied with translations of them by the experts of these languages found among us,—gentlemen who have spoken them from their infancy.

The author is certainly right in the importance he places upon the study of military history, and surely none should be more interesting, if more useful, than that of our own great war. Now, that the stupendous work of the Rebellion Records is about completed, it is to be hoped that the War Department will continue the good work, by detailing a board of competent officers to write a history of the war from these Records. Such a history would be the most perfect one ever written of any war, because there is such a quantity of data from every side, and there are officers in the service qualified for the work,—qualified by reason of their literary attainments, their patience and industry, and above all, their ability to be perfectly impartial in their treatment of the subject. As a readable history the scores of volumes of these Records are good for nothing; but as data, and for reference, they are invaluable. Every post-library should contain an unbroken set, but it seems absurd to encumber the quarters of every field officer with so much waste paper.

When in this connection the essayist says "we need not go back of Napoleon's time," one is reminded of the lectures of our dear old professor of engineering upon Lutzen (the first battle), and Blenheim, and our struggles with "Noizet's method." Had the professor lived and not retired from the chair, it is confidently believed he would have eventually gotten as far forward as Napoleon's time.

In detailing a plan of instruction for cavalry, Captain Pettit includes "guarding convoys" as of its "legitimate" duties,—a mistake that has often been made by commanders in war. Cavalry is such an expensive arm, and it has so many duties in war which cannot be done by other troops, that it should never be employed for any work that can be done as well, or better, by foot soldiers. Escorting convoys is emphatically of this kind, and it has no use for cavalry. The duties of troops with convoys is to guard them from foraging parties and raids of the enemy, and to keep them moving, mainly the latter, which, upon most American roads, means prying wagons out of mud holes, and hauling them across swollen streams with ropes. For all this work a horse is only an encumbrance. Attacking convoys is quite another matter; it is true cavalry work, and we should be thoroughly drilled in it in time of peace. Cavalry is an offensive, and not a defensive arm.

And the captain says "three mornings per week should be given to minor field exercises and two to close-order movements," during the drill season. This may do for infantry, but not for cavalry. There are too many letters in what he metaphors the caval-



ryman's "alphabet of war" (p. 38, par. 3), for him to devote so little of his time to their study, without the hazard of having his neck broken when he goes into his "words." In spite of the discouragement we have received from the prophets since before the days of Seidlitz, we cavalry folk still have a notion that we shall have work to do *on* the battlefield, and we must fit ourselves first for it. If drill is our "alphabet," and minor tactics our "words," and manœuvres our "sentences," the charge is our whole language, and it is what we want to teach our men and horses. But this means that the men must be perfect horsemen, and the horses must be perfectly trained; but the men must also be expert in the use of their arms,—the sabre, pistol and carbine,—and they must be thorough in their drill. If Captain Pettit has ever undertaken to train a horse for use in a troop, he must know how difficult that letter of our alphabet is to master. It takes just 180 hours of a skilled horseman's patient labor to train one horse properly. No, we cannot give up three days in each week of our short drill season to minor tactics; nor do we believe it necessary, though we admit the great importance of the instruction. No cavalry captain can contemplate his troop on the last day of the drill season, without wishing he had another month to drill it.

## II.

### "The Status of Medical Officers."\*

By Major J. Van R. Hoff, Surg. Med. Dept.

**I**N a "comment" published in the last issue of the JOURNAL OF THE MILITARY SERVICE INSTITUTION [January, 1897] under the above caption, the writer thereof replies to a critique by Major Kilbourne, Surgeon, U. S. Army, published in the September issue of the JOURNAL. This critique was elicited by a criticism, presumably by the same writer, of a paper entitled "Outlines of the Sanitary Organization of some of the Great Armies of the World," published by me in the Proceedings of the Association of Military Surgeons, U. S., 1894 and 95.

The "comment" contains the following statement, \* \* \* "the pamphlet which called forth a partial reply in the March number of this journal contained a distinct attack on the artillery arm of our service."

This statement is without foundation. In some hundred or more pages of printed matter not a single reference is made to "the artillery arm" of our service, and in the entire paper so far as my memory serves me the word artillery, except to enumerate the number of medical officers required therewith occurs but once, and that under the title "The Russian Army," in which a brief paragraph [Vol. V., p. 489, Proceedings Association Military Surgeons U. S., 1895] I gave what my investigation of the subject showed to be the status of the military surgeons of that army, a status which was until very recently, if it be not so now, identical with that of the Russian artillery officer.

The artillery of the United States Army cut no figure in the matter under consideration, and instead of an attempt being made by me to draw a parallel between its development and that of our own Medical Department, it was not even thought of, much less mentioned.

The object of this communication is accomplished in the foregoing, but in view of the further statements made by the writer of the "comment" I will venture to invite the attention of those interested in the subject to one or two facts regarding our Medical Department.

It goes without saying that the country demands an efficient military sanitary organization and that in order to this there must be a competent military medical personnel. To

\* We respectfully invite the attention of those interested to p. 429, No. 80, March; p. 389, No. 83, September, 1896, and to p. 216, No. 85, Jan., 1897; also to the interesting articles by Surg-Col. Hill-Climo, p. 347, No. 83, and p. 507, No. 84, November, 1896.—Ed.

secure this personnel the Medical Department opens wide its portals of admission to every reputable graduate of a reputable medical school, yet in spite of the extraordinary advantages of, and undue partiality shown to this branch of the service as alleged, the Medical Department has practically never been without vacancies, though every effort to fill it has been and is being made.

Is this the condition of any other branch of our service? Certainly there is no dearth, nor has there ever been any, of candidates for those offices which our critic has endeavored to show, are in rank, emolument and privileges below those offered by the Medical Department.

If it be true, as he says, that these are "days of large endowments and abundant educational facilities," why do not those who would follow the flag study a profession and come into the Medical Department with all its alleged advantages and where there is ample room, rather than wait hopelessly for a presumably less desirable commission in the line?

They never have, and they never will, the seeming advantages which are alleged to attach to the Medical Department disappear entirely in active service, under which condition its officers get a far larger proportion of hard knocks and much less material advancement than their comrades of the line.

We of the Medical Department ask nothing of the legislators except to be permitted to perfect our organization, to perform our current duties, and to prepare for the war we must expect.

We do not seek to perform the duty or exercise the function of the line officer. There is enough for him and us to do each in his own sphere. We did ask, in the interest of efficiency, to be placed upon the same military foundation with other staff officers and there the law of 1892 has placed us.\*

Finally, the Medical Department needs no defense. The history of that department is written in the history of every war, and the record of its officers is found upon the monuments erected to the memory of those who died gloriously in battle.

Vancouver Barracks, Wash., January 18, 1897.

### The Status of Medical Officers: A Reply.

"This critique was elicited by a criticism of a paper entitled Outlines of the Sanitary Organizations, etc., published by me in the Proceedings of the Association of Military Surgeons, U. S., 1894-95," writes the above author, and in so writing is mistaken. We never saw the article in the proceedings mentioned, nor have we presumed to go out of our way to criticise an article appearing in another journal.

The circumstances of the case are as follows: Early in 1896 this officer brought us a pamphlet on the subject named, which had been reprinted from a Detroit medical journal, and requested that it might be noticed in the JOURNAL M. S. I. This pamphlet had been written for a purpose and with a purpose, and culminated in a claim, the realization of which would debase the military status of line officers and diminish their professional position and esteem relative to a class of officers who have already obtained very liberal advantages in other respects, and for a distinctly non-military reason. As the article had received rather wide circulation, and as the culminating claim was at variance with the regulations (sec. 18) and the orders of the Secretary of War (front page) we ventured to combat the ideas contained therein. But in so doing we wish it may be clearly understood that we have no animus against the medical officer *per se*. We have carefully refrained from any personality and from all individual allusion, except in reference to such facts as any one may cull from publicly distributed documents, like the Army Register.

\*The act of 1892 on which this claim is based reads as follows:—"That medical officers of the army may be assigned by the Secretary of War to such duties as the *interests of the service* may demand."—This author claims that the above act abrogates section 18 A. R. (See articles of Geneva Convention regarding non-combatants.)—ED.

Our critic proceeds to deny as unfounded the allegation that he had made what we considered an attack upon the artillery arm of our service. And right here we must continue to differ from him.

Nine lines below the quotation derived from our comment in the January number (p. 216) occurs the following: "A reading of this portion of the article naturally *leads to the inference* that a similar development has taken place in our own service, \* \* \* and herein lay the sophistry *and herein the attack.*" In other words we did not accuse the author of making a direct attack, but one by inference or suggestion, and we still believe the inference a just one.

The military status of the Russian artillery had no natural place in an article devoted to sanitary organization, and if an analysis of this status did not serve a certain purpose, why was stress laid on its supposedly unfavorable condition with reference to that of the other arms? Why was a comparison instituted between the artillery status and that of the medical element in an article which began with a claim of equality between these two as to military status in one service and culminated in a similar claim regarding our own army through the supposed abrogation of section 18, A. R.? We claim that the mating of terms, medical and artillery, the association of ideas, the juxtaposition of fact and statement in an article culminating in such a way, fairly suggested the inference drawn. To our mind the author's position is like that of one, who, in order to illustrate a point of conversation, had drawn two lines sufficiently near each other and in the same direction, and should afterwards claim that the relative position of these two did not suggest parallelism.

Recent advices assure us that the Russian medical officer is a much respected official rather than an officer in a military sense, and has no right of command; while the general officers of artillery are (and have been) assigned to large commands, consisting of all arms, by the same means and on the same footing as those of infantry and cavalry.

And here we would close a discussion that has ceased to be enlightening, but for one remark of the author, who asks, "why do not those who would follow the flag *study a profession* and come into the medical department, etc.?" We have always labored under the impression that we had studied a profession, and the gist of our contention is that our profession should be treated with the same consideration and freedom from encroachment as that of the medical officer. No officers are so jealous of their professional prerogatives as those of the medical department, and we ask that they shall show to others some portion of that regard which they demand for themselves. As to entering the medical department, that is a matter of taste, and the query is pertinent, why, if this officer desired to command troops, he did not take his place fairly and squarely among officers of the line where the right of command honorably and legally belongs, instead of attempting to gain it in this indirect fashion? To enter the medical department and obtain a rate of promotion out of all relation to that of other branches of the service—given for a reason absolutely non-military—and from the vantage of a position, so gained, attempt to grasp the attribute of a profession not his own may seem to this officer a clever stroke, but the victims thereof can hardly be blamed for viewing the matter in a different light.

"We did ask in the interest of efficiency to be placed on the same military foundation, etc." Why? We have the support of no less an authority than Surgeon-Col. Hill-Climo to the assertion that this would have exactly the contrary effect by attracting officers away from things medical to others more showy but less professional in character, to the detriment of the former and without particular benefit to the latter. In plain terms then, is it not "Military Power," rather than increased efficiency, that this officer seeks? Holy Writ warrants the assertion, ye cannot serve two masters; for either ye will hate the one and love the other, or else ye will hold to the one and despise the other. Russia, Austria, Italy, Germany, France, and even England with her heterogeneous organization, have not discovered that medical efficiency can be increased by giving the officers of their sani-

tary elements command of line troops—and their medical departments, particularly those of Germany and France, are understood to be in excellent condition. Why is it that a certain class among our medical officers feel compelled to seek such drastic, far fetched and unusual means for the accomplishment of such a purpose?

“We do not seek to perform the duty or exercise the function of line officers.” Why then seek the right to command them?

“There is enough for him and us to do each in his own sphere.” Yea, yea, say we; and will this officer kindly apply the principle to the case in point? It is just this fact, coupled with the excessive rate of promotion granted to medical officers, that makes their claim of military domination over men older in years and in service and in every attribute that goes to make an officer, such a wrong to these others and so detrimental to the service.

*Suum cuique*, say we.

### III.

#### “The Sioux Campaign of 1890-91.”

IT is not my desire to prolong a fruitless controversy, and one which could not but provoke some bitterness of feeling if carried to the limit. Lieut. Hawthorne seems desirous of reaching, but perhaps does not appreciate; and it is only for the purpose of entering a mild protest against his most unwarranted assumption in the first criticism, and emphasized in the second comment, as to the sources of my information, and the care I had taken to discover the facts, and also to point out some further inconsistencies of his position, that I venture to task the patience of the readers of the JOURNAL again upon the subject of the Sioux campaign of 1890-91.

It is past my comprehension that Lieut. Hawthorne should commit himself to such a statement as found in his first paper, viz., that he had sought everywhere for the authority for a certain statement in my paper, whereas the statement in question was to be found in one of the most prominent reports on the subject. A little investigation upon his part will reveal to him equally good authority for all statements as to facts, and his criticisms really bear upon those authorities and not upon me.

For the benefit of those gentlemen from whom he has received, as he states, “complete support” of the statements in his first paper, and to relieve his mind of any further feeling of responsibility in the matter of checking me, and keeping me straight in my information, I will state that my sources of information are, in addition to the reports of the Indian Department, all the reports of officers in command of troops or detachments during the campaign which could be obtained, some of them confidential, and extracts from others which could not be obtained in full; numerous letters and personal statements from officers who were in the campaign, and among these officers two who assisted in burying the dead Indians at Wounded Knee, and another who remained at Pine Ridge during the entire disturbance, and also the one who constructed the map referred to; the agent at Rosebud, who had been there some years; together with a close observation of the condition of the Indians on this reservation for many months before the outbreak, and certain memoranda made during the campaign.

I thought I had quoted sufficiently from the most conspicuous of these sources to convince my critic that I had sought to get at the truth, but since he refuses to be convinced, and continues to talk of second-hand testimony and things “*wholly imaginative*,” stating that “Reports of secretaries cannot teach eye-witnesses anything concerning the events of that day,” the case seems hopeless. Needless to say, of course, that reports of secretaries are made up from the reports of eye-witnesses, and others in a position to know; but if Lieut. Hawthorne has more reliable and accurate information in his possession than has yet been given out I should be pleased to have it. So far he has given very little evidence of such possession. He is ready enough to deny, but ventures with great caution upon the affirmative ground. He does state, however, that “135 *seem to be about the*



*probable* number of Indians killed *on or near* the field," which is not very specific for one who is so ready to condemn, and who declines to accept information given in official reports. It would be interesting to know if being an eye-witness enabled Lieut. Hawthorne to judge of the number of Indians killed better than one who counted the dead bodies after the fight. I have before me now, from an officer who assisted in burying the dead Indians, the statement in writing that he himself counted 156 bodies *on* the field, 84 bucks and the remainder women and children. Presumably the Indians found others at a distance, or added those who escaped to die of their wounds. Be that as it may, the official report of the Indian Department is 185 killed, which is the authority for my original statement on this point, and that number I am inclined to accept as very nearly correct.

I should also like to know if Lieut. Hawthorne is aware of the fact that 14 of the 120 warriors had left the camp on the morning of the 29th before the fight, and if so why he omits to note it; also whether he counted either the soldiers or Indians personally, the only thing which could justify him in disputing an official record; or if he thinks his presence there enabled him to judge the original intentions of the Indians; or if being an eye-witness of a fight in which the Indian scouts did not take part, enabled him to judge better than the officer who was in command of them as to their probable value and efficiency in case they had been called upon; or finally if this advantage enabled him to give expert testimony upon the condition of the sentiment in the 7th Cavalry. Referring again to my alleged charge of savage cruelty displayed by this regiment, which Lieut. Hawthorne seems so amusingly eager to defend, I desire to quote the following from an article by Capt. E. S. Godfrey of that regiment on "Cavalry Fire Discipline," in the JOURNAL for September.

"Before the battle of Wounded Knee I had a letter from a distinguished officer of the army in which he said: 'I hope even yet to see the campaign settled without a fight. If there is a fight, however, there can be no question as to the result.' \* \* \* As soon as the Indians crossed the ravine, perhaps two hundred yards distant, and attempted to escape on the Agency road, I gave the command 'commence firing.' I know the men did not aim deliberately and they were greatly excited. I don't believe they saw their sights. They fired rapidly but it seemed to me only a few seconds till there was not a living thing before us; warriors, squaws, children, ponies and dogs—for they were all mixed together—went down before that unaimed fire, and I don't think anything got nearer than a hundred yards." This expresses all I intended to convey, viz.; that they killed everything in sight; and they continued to do so to the end. It seemed unfortunate, but doubtless could not have been helped after the fight opened. At any rate I had no intention whatever of making such a charge as Lieut. Hawthorne discovered in my remarks, or even of criticising adversely the conduct of our troops under all the attendant circumstances.

Lieut. Hawthorne totally misapprehends my original statement in regard to taking, "to a certain extent, the Indians' side of the question." The "Indians' side" was not as against the army, either at Wounded Knee or elsewhere, but as against the general policy pursued toward them for many years past, often against the advice of men well qualified to judge of the Indians' needs, and of the best methods of controlling and developing them. I have lived in, or near the borders of, an Indian country for three-quarters of my life and I think I know something of their character, and of their trials along the road toward civilization and self-support.

Wounded Knee was simply an incidental feature of my original paper, but apparently the only one Lieut. Hawthorne thought worthy of his attention. He takes in his first criticism nine items, all upon this affair, and asserts that a story is "woven around them," which is absurd to the last degree.

Permit me to say in conclusion upon this subject, that if Lieut. Hawthorne objects to a little personality, which I did not initiate, and which I trust has not transgressed reasonable limits, let him think upon the Golden Rule.

## Reviews and Exchanges.

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### The Battle of Chancellorsville.\*

THE disaster which overtook the Eleventh Corps at Chancellorsville was so overwhelming that all blame for the loss of the battle has naturally been placed by many on that corps, and it has been discredited accordingly. The author of the volume under consideration, in the course of certain investigations into the actual condition of things which occurred on the eventful 2d of May, 1863, obtained so much unlooked-for information in extenuation of the conduct of the Eleventh Corps in the action that he determined to publish the results. The course of his inquiries extended over a period of five years, during which he paid three visits to the battle field, in company with officers of both armies who were actually engaged in the battle.

#### PERSONNEL OF THE ELEVENTH CORPS.

It is the generally accepted impression that the Eleventh Corps was exclusively composed of Germans, or foreigners, and at that time it was frequently designated as the foreign contingent of the Army of the Potomac. The author finds that about three-fifths of the corps were American citizens by birth, and that many others were naturalized citizens. The corps at Chancellorsville—about twelve thousand strong—consisted of twenty-seven regiments, eleven of which were new, while the remainder had been tested in several campaigns and were veterans. There were regiments from Connecticut, Massachusetts, New York, Pennsylvania, Ohio, Illinois and Wisconsin. Many of the enlisted men composing the foreign element had seen more or less service in foreign armies and were well instructed. Some of the regiments were ranked as high as any in the service, and, “in the review of the Army of the Potomac by President Lincoln, in April, 1863, the Eleventh Corps made a fine appearance, particularly the division commanded by General Schurz, which impressed the presidential party as the best drilled and the most soldierly of all the army that passed before them.” The following were all good regiments, Twenty-fifth, Fifty-fifth, Sixty-first, Seventy-third, Seventy-fifth, and Eighty-second Ohio, they were veteran regiments, nearly all American citizens. The Forty-first and Forty-fifth New York were veteran regiments, also the Seventy-third and Seventy-fifth Pennsylvania, and the Fifty-fourth New York. Of the new regiments the Seventeenth Connecticut and Thirty-third Massachusetts were reckoned as among the best of the New England troops. The Twenty-sixth Wisconsin won distinction in the fight, and was afterwards considered as one of the best regiments in the service. The One Hundred and Fifty-third Pennsylvania, the One Hundred and Thirty-fourth, One Hundred and Thirty-sixth, One Hundred and Fifty-fourth and One Hundred and Fifty-seventh New York were all well officered and were regarded as good troops (34 *et seq*). Of the superior

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\* *The Battle of Chancellorsville.* The attack of Stonewall Jackson and his army upon the right flank of the Army of the Potomac at Chancellorsville, Virginia, on Saturday afternoon, May 2, 1863. By Augustus Choate Hamlin, formerly Lieutenant-Colonel and Medical Inspector, U. S. Army. Historian Eleventh Army Corps. Bangor, Maine. Published by the author, 1896.

officers of the corps, General Howard, who commanded it, had already established his reputation on many fields, nevertheless there was some feeling against him in the corps on account of personal traits (34). The first division was commanded by General Charles Devens, who was sent to the corps by Hooker to replace McLean; an unfortunate change, for the latter had fought Jackson in his two former flank movements, was thus aware of his manner of fighting, and had he remained Jackson might not have surprised the flank of Hooker's army. McLean was a veteran of long service, had commanded the division for some time and was familiar with it (35). The commander of the second division was General Von Steinwehr, a trained soldier, who had received a military education in Germany and had served in our army during the Mexican War (44).

Third division, General Carl Schurz, a strong man intellectually, not a trained soldier, but well versed in military matters (44).

The brigade commanders were, McLean, previously mentioned, a son of Justice McLean of Ohio, who had won his way up by hard fighting. Von Gilsa, a typical German soldier with the rank of major in the Schleswig-Holstein war, and who had served with great credit up to that time in the Civil War. Buschbeck, son of an officer and educated in the military schools of Germany; the records show that he was a man of high soldierly qualities, and was well thought of by Generals Sherman and Hooker. Barlow, a new comer in the corps and little known to its members, a martinet and a hard fighter. Schimmelfennig, an ex-officer of the Prussian army, well read in military science and of undaunted courage. He and Von Gilsa felt keenly the unjust imputation of Chancellorsville and chagrin hastened their death. Kryzanowski, a Polish exile, who entered the service when Sumter was attacked. The chief engineer of the corps, Major Hoffman, had received his military education in Prussia, had served with distinction in Denmark, the Crimea and Africa, and was a sterling soldier.

Some of the colonels and subordinate officers of the corps were fine American officers, many of them were veterans with good records, and a few had served with distinction in other wars. The personnel of the corps throughout was certainly very good, and the corps did not deserve the stigma which had been cast upon it. A scape-goat was necessary and the corps was made one (34 *et seq.*).

#### POSITION OF THE ELEVENTH CORPS.

The Eleventh Corps was on the extreme right of the army, and, facing south, covered a distance of a little over a mile. Hooker's position was so strong that the Confederate engineers reported adversely to any attack upon it from the eastward (11). Jackson was therefore directed to make a flank movement to the right and rear of the Union army. For this purpose he took fully one-half of Lee's army, seventy regiments, or about thirty thousand infantry, besides artillery and four regiments of cavalry. At daybreak Jackson started, his columns filling all the roads and paths leading west through the forest in front of the right flank of the Union army. His march was in plain sight for several hours of the Third and Eleventh Corps, and within easy artillery range. Birney reported the movement to Sickles, and the latter reported it to Hooker (13). With Jackson's well-known reputation for flank attacks it is very singular that his movement should have impressed the high ranking officers of the Union army with the idea that Lee's whole army was in retreat. Was the fact that Hooker had relinquished the offensive and had taken a strong defensive position any reason for thinking that Lee was retreating? Since the position was strong, was that not a good reason for Hooker to think that Lee would try to turn it? And since the left flank was particularly strong, should he not have had constantly in mind the danger of an attack on his right? "Hooker's orders all indicate a determined resolution to remain on the defensive, and his words of caution to Sickles when

he went down to the Furnace with Birney's Division were not to bring on a battle." When, in consequence of some artillery fire, Jackson's march was deflected to the south, out of sight of the Union scouts, Hooker was satisfied that Lee was retreating and no successful effort was made to fix the direction of march of the disappearing troops. At 5 P. M. Jackson had his force in position, rested and ready to attack.

"It seems incredible that an army of thirty thousand men could be moved directly past the front of a much larger force, and arrange itself in three lines of battle, within half a mile of the force to be attacked!"

#### WARNINGS OF DANGER UNHEEDED.

Lieutenant-Colonel Carmichael, One Hundred and Fifty-seventh New York, in charge of a portion of the picket line, reported at headquarters early Saturday morning that during the night he had heard trains moving past his front, "and was told for his pains that new troops were easily frightened." Colonel McLean reported to General Devens that officers had seen the enemy's troops moving toward their flank at 10 A. M.; the latter reported the fact to General Howard. Colonel Friend, division officer of the day, reported to General Devens that a large force of Confederates was passing to his rear, but his report was discredited. Upon making the same report at corps headquarters he was severely rebuked (55). Early in the afternoon, Captain Dilger, Battery I, First Ohio, while reconnoitring, rode into the enemy's forces north of the Luckett farm and only a little over a mile from Von Gilsa's position on the extreme right flank of the corps. He was pursued by a force of cavalry, but escaped and reported his adventure at Hooker's headquarters: he was laughed at for his pains. Upon reporting the same facts at corps headquarters, "his remarks were received without the slightest confidence." General Devens was repeatedly warned of the enemy's presence; Colonel Lee of the Fifty-fifth Ohio, Colonel Richardson of the Twenty-fifth Ohio, made reports to this effect and urged that dispositions be made to meet attacks on the flanks, but they were not believed. The author gives other instances of warnings and repeated warnings to superior officers, all of which were equally disregarded (55 *et seq.*).

In such a close country as that surrounding the position of the Eleventh Corps—heavily wooded on all sides with the exception of small farm clearings here and there—and in view of the various reports which had been made in regard to the enemy's presence, it would seem that a strong reconnaissance by infantry, in the absence of cavalry, should have been ordered by the corps commander along the Pike and Plank roads. Even a single company or regiment would have settled the question in half an hour. Fatal fatuity to neglect these repeated warnings! It was certainly unfortunate, in view of later events, that the only cavalry with the Army of the Potomac at this juncture was one small brigade of three regiments. Even this small force was divided, a regiment being assigned for duty to each of three different corps, a course which must necessarily have proved fatal as far as definitely locating the enemy was concerned, for a small force of infantry in that close country would have been able to brush aside a regiment of cavalry. There might be another story to tell had the Cavalry Corps remained with the army instead of being sent under Stoneman to cut Lee's communications, an operation which had no effect upon the movements of the Army of Northern Virginia.

That General Hooker was impressed by the word from Sickles that there was a movement of troops along his front and towards his flank is evidenced by the order issued to Howard and Slocum. Hooker had inspected the line of the Eleventh Corps, and, on receiving the word from Sickles, issued his 9.30 A. M. order. He said: " \* \* \* The disposition you have made of your corps has been with a view to a front attack by the enemy. If



he should throw himself upon your flank, he wishes you to examine the ground and determine upon the positions you will take in that event, in order that you may be prepared for him in whatever direction he advances. He suggests that you have heavy reserves well in hand to meet this contingency. The right of your line does not appear to be strong enough. \* \* \* *We have good reason to suppose that the enemy is moving to our right.\** Please advance your pickets for purposes of observation as far as may be safe, in order to obtain timely information of their approach." Although this order was discussed by Howard and Schurz, and although the latter argued in favor of a change in the position of the troops to better meet a flank attack, and indeed suggested specific changes, no change of any moment was made (21). And although all subsequent information should have tended to create further suspicion in the minds of both the army and corps commanders of a formidable flank attack, still the former did not see that his orders had been obeyed and even permitted the corps reserve to be withdrawn; and the latter was so little impressed that he went in person as far as below the Furnace, accompanying Barlow's brigade when it was sent to join Sickles' movement. Barlow's brigade, the largest in the corps, about three thousand men, was the corps reserve, and was withdrawn from its position by Captain Moore, of Hooker's staff, between 4 and 5 P. M., at the very moment when over fifteen thousand of the enemy's troops were resting on their arms within a mile of the right flank of the corps. When Howard returned the storm had burst (54). The position of the Eleventh Corps was still further jeopardized by

#### SICKLES' FATAL RECONNAISSANCE.

General Sickles' ever present desire to be in touch with the enemy was on two occasions a matter of grave concern to the Army of the Potomac. If his desire to meet the enemy had been emulated by others in high command the history of the war might be somewhat abridged. But there are occasions when discretion is the better part of valor. While Jackson's troops were gradually disappearing in the forests, Hooker, convinced that Lee was retreating and his army demoralized, was permitting Sickles to gradually advance troops from his centre. Up to 5 P. M., the time when Jackson was ready to develop his attack, some twenty thousand men had been withdrawn from the general line and pushed forward to the Welford Furnace and beyond, even to the unfinished railroad cut, some three miles from the now threatened Eleventh Corps. "At this hour, past five P. M., Hooker, Sickles, Warren, and most of the other general officers, excepting perhaps Slocum, believed that the rebels were in full retreat, and that the glorious opportunity of capturing a large part of their force, with cannon and trains, was rapidly passing away. So completely did this idea take possession of their understanding, that they did not entertain or discuss even a suspicion that Jackson, instead of seeking flight, was marching for their unguarded rear. Sickles, away down in the woods below the Furnace, was so saturated with this notion of Lee's flight that he refused to listen to the staff officer who brought him the information that the Eleventh Corps, less than two miles in his rear, had been fighting for more than half an hour and was being overpowered by greatly superior forces. Not until the second officer arrived, bringing details of danger and disaster, could he realize the absurdity of his expedition and the extreme peril in which his troops were then placed. A more ridiculous and stupid surprise did not occur in the history of the Civil War. It seems incredible that, when word came from Sickles to Hooker that he was among the rebel trains, Jackson was actually three miles almost directly in his rear, and was about to hurl the most of his thirty thousand men upon the feeble obstacles in his front, comprising only the forlorn Eleventh Corps, then deprived of its reserve brigade. It is still more incredible that, when Birney was preparing to bivouac with his powerful

\* Italics are mine.—E.

division below the Welford house, two miles below the Plank road, wondering what had become of the enemy, he was not aware that Jackson had been pulverizing the deserted and depleted Eleventh Corps of nine thousand men for more than an hour. \* \* \* Pleasanton, with his cavalry, instead of scouting on the the exposed right flank, and developing the concealed enemy, clung to the shadow of headquarters, where he inundated Hooker with his vain advice." Sickles' movement was fatal. Just about the time that thirty thousand men were about to fall upon the right flank of the nine thousand at that time holding the lines of the Eleventh Corps, the corps was isolated and fully a mile separated it from any troops—Twelfth Corps—which could come to assist it, or which could form a support upon which it could rally. General Hooker permitted this movement of troops from his centre in spite of the fact that it followed his 9.30 A. M. order, and although he knew that Stonewall Jackson was with Lee's army and that he had a method all his own of making flank attacks and of making of them a success. That the danger of such an attack should have dominated Hooker's mind to the extent of excluding the idea of any other possible move by the Army of Northern Virginia is forcibly shown by his testimony before the Joint Committee on the Conduct of the War, on March 11, 1865, as follows: "At that time it had been reported to me that the enemy had been making a flank movement to our right, and I gave directions \* \* \* to hold the Eleventh and Twelfth Corps in readiness to receive an attack in that direction, at the same time suggesting that heavy reserves be held well in hand. \* \* \* These movements of the enemy it should be remembered, were made in broad daylight, and were observed from the headquarters of the first division of the Eleventh Corps."

#### JACKSON STRIKES THE ELEVENTH CORPS.

It is purposed to follow briefly the progress of the flank attack, with a view to show the amount of resistance made by the Eleventh Corps, and which the author claims should aid in removing the stigma attaching to it.

At 5.15 P. M., all his troops being in position, the signal was given for Jackson's men to advance. The Confederate line extended fully a mile on either side of the Pike, along which the Eleventh Corps was posted. Consequently the successive regiments as they changed front to meet the advancing Confederates were first assailed in front, and then shortly after on both flanks, and forced back. There was resistance made to the advance, but under the circumstances the Confederates could not be long held in check, and the Federals were driven back. Under these conditions there was necessarily much confusion, but the retreat was not a disorderly rout as has been charged. Some of the men as they were driven back joined successive regiments as they formed up to meet the advancing attack, while others continued their flight, refusing to halt, as far as the Chancellor house, two miles distant. Portions of the following regiments made resistance until they had no further showing, or until it became a question of flight or annihilation; Forty-first, Forty-fifth, Fifty-fourth New York, and One Hundred and Fifty-third Pennsylvania. The Seventy-fifth Ohio breasted the storm for nearly ten minutes, or until utterly wrecked. A brave stand was also made by the Twenty-fifth Ohio, reinforced by some of the fugitives; when they broke the disorder was very great and the remnants of Devens' division disappeared.

The second attempt at resistance was made by Schurz's division, assisted by remnants of Devens' division. "General Schurz was impressed early in the day with the weakness of his position in case the attack was made from the westward." He wished to form his line from the Plank road north along Hunting Run, but was refused permission to do so. He did, however, of his own volition, cause the Twenty-sixth Wisconsin and Fifty-eighth New York to form front facing the west and placed the Eighty-second Illinois in support. Thus

was formed the nucleus for a new line, the wisdom of which became apparent when the attack was developed. This line was attacked with great energy, resisted obstinately for some twenty minutes, but eventually was forced back, being flanked.

In the third and last attempt to hold Jackson at bay only four thousand or five thousand of the Eleventh Corps took part. The rest of the corps had retreated, or were left on the field, or were with Barlow's brigade below the Furnace. Although fighting about an hour no reinforcements had reached the corps.

The remnants of the corps took shelter in the shallow rifle pits which had been dug in the morning by Barlow's brigade. It was about this time, 6.30 P. M., that Hooker first heard of the attack on the Eleventh Corps, the fugitives bringing him the news. Here again the front attacks of the enemy were repulsed, but after both flanks were turned the men withdrew slowly, taking shelter in the woods in the rear.

In both these stands and during the retreat from them, Dilger, at first with his battery and finally with one gun, rendered marked services.

With the forcing of this line the advance of the enemy was for a time suspended, for there was no pressing forward in pursuit. The remnants of the Eleventh Corps next appear as a part of the general line of defense around Fairview (64 *et seq.*).

The foregoing brief statement of the resistance offered by the Eleventh Corps during Jackson's flank attack is corroborated by the reports of the corps, division, brigade and subordinate commanders, and by those of the Confederate officers opposed to them.

In view of these facts is there justification for Warren's statement in his official report? "The Eleventh Corps infantry made no stand at all behind its breastworks, but ran away while yet the enemy's bullets scarcely reached them." Is Hooker just in his testimony before the Joint Committee on the Conduct of the War?

"The Eleventh Corps had been completely surprised and disgracefully routed. \* \* \* No disposition had been made to receive an attack, and there were no pickets on the alert to advise of the approach of an enemy." The blame for the defeat is then laid on Howard, although the Commanding General himself must have authorized the withdrawal of his reserves, had refused to be convinced that Jackson was menacing his right flank, and had persistently spread the report from his headquarters that Lee was retreating. It was the duty of the high-ranking officers to ascertain the correct facts. Is there not an endeavor, but partly concealed, to excuse a failure to develop the true meaning of that movement of troops by placing all the blame for Jackson's success upon the unfortunate Eleventh Corps, the object of the attack? Can any one say that any body of troops of equal number, under similar circumstances, would not have been beaten?

By 7 P. M. the Eleventh Corps had been driven off the field, the bulk of the Third Corps and a part of the Twelfth were still in the vicinity of the Furnace, why then were not the results of Jackson's attack more complete? The author gives several reasons. First, Colquitt's error. "Seventeen regiments of the right wing \* \* \* had been detained by the fatuity of General Colquitt, who commanded the right brigade of Rodes' first line of battle," because he thought he was being flanked, "and when they did arrive on the field of battle, the wrecks of the First and Third Divisions of the Eleventh Corps had escaped from almost certain and complete destruction or capture." Second, the delay after the remnants of the Eleventh Corps had been driven from their third position. "Jackson ordered his men to push forward, but Colston and Rodes, who commanded the two front lines of battle, urged Jackson to halt, and represented to him that their men were too much exhausted by the long march of fifteen miles, the lack of food for the entire day, the difficulty of marching through the dense thickets, and the attack on the Eleventh Corps, to advance further, and they advised their chief to call a halt and reform. General Jackson called a halt, but with great reluctance, for he believed, and with reason, too, that one more effort would

place his men in command of the open field in the rear of the Chancellor house and also of the only road by which a large part of the Third and Twelfth Corps could escape." Third. The wounding of Jackson. This event occurred about 9.15 P. M., and Stuart, who succeeded him, did not arrive until midnight, "and in the meantime Jackson's victorious corps was adrift. \* \* \* For more than two hours no officer felt at liberty to take any decisive action, and the golden opportunity rapidly passed away. \* \* \* The wounding of Jackson was a most fortunate circumstance for the Army of the Potomac at this moment, and it was certainly fraught with bitter disappointment to the Confederate cause. At nine o'clock the capture or destruction of a large part of Hooker's army seemed inevitable. Thirty minutes later all was changed by Jackson's carelessness or rashness. There was at this time great uncertainty and a feeling akin to panic prevailing among the Union forces around Chancellorsville, and it may be said truthfully that there was considerable of this feeling among the rebels themselves, though flushed with victory."

The peculiar atmospheric conditions prevailing at the time of Jackson's attack are clearly explained by the author. It seems these conditions were such that Hooker, at the Chancellor house, about three miles from his extreme right flank, heard no sound of the battle and learned of the attack through fugitives from the field. At the same time, "McLaws \* \* \* was waiting to hear sounds of Jackson's guns before attacking Hancock with vigor. Posey and Wright, with their brigades concealed in the woods on Birney's flank, were listening for the same signal, but failed to hear definite sounds. Sickles also, at the Welford Furnace, did not hear a sound of the fight which wrecked the Eleventh Corps."

It remains an open question which side was favored by this condition of affairs.

In regard to the responsibility for the disaster to the Eleventh Corps, the author says: "The investigation clearly proves that the disastrous results of the battle at Chancellorsville cannot be justly ascribed to the want of vigilance and soldierly conduct on the part of the rank and file of the Eleventh Corps. \* \* \* There is certainly reason to believe that there was a deliberate conspiracy to shift the errors of the battle upon the Eleventh Corps, and the statement of Hooker, Sickles, Warren and Birney furnish sufficient proof of the intent. Those who were the most implicated in the wild-goose chase below the Furnace, and who are the authors of the misfortunes of the army, are the foulest in abuse and loud-est in falsehood." The fault was one of position, not of the troops. The book is a valuable addition to the literature of the war, and the questions raised are well worth searching investigation. Justice requires this.

The Addenda contains much matter of great interest, also nine very fine maps showing the positions of the troops in detail at 8 A. M. and from 5 to 12 P. M.

FRANK H. EDMUNDS,  
Captain First Infantry.



# Annual Report.

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The Military Service Institution of the U. S.

Governor's Island, N. Y.

JANUARY 1, 1897.

*To the Members of the Military Service Institution of the United States.*

GENTLEMEN:—I have the honor, on behalf of the Executive Council, to submit the following report of the operations of the Institution during the year 1896.

The Treasurer's report shows the affairs of the Institution to be in an excellent condition, the receipts for the year from all sources exhibit a gratifying increase over those of the previous year, the sum total forming the largest annual income of the Institution since its formation.

The excellent essay of Major Geo. S. Wilson, presented in the May number of the JOURNAL, forms the first of the series of prize essays of the Infantry Society, published by the Military Service Institution in accordance with the arrangement noted in the last annual report.

This interesting article, entitled "The Army: Its Employment during time of peace, and the necessity for its increase," is admirably written and evinces a clear appreciation of the importance and bearing of the subject, and should aid materially in impressing upon the minds of our people the great necessity which exists for placing our small army in a position as to organization and numbers, which will better accord with modern requirements and the dignity of our nation.

The Gold Medal of the Institution for 1896 was awarded to Captain James S. Pettit, 1st U. S. Infantry, for the best essay upon "The Proper Military Instruction for our Officers; The Method to be Employed, its Scope and full Development."

The series of Historical Sketches, the announcement of whose approaching publication was made in the report for 1895, have since made their appearance in handsome form, and the gratifying demand for the volume, I am glad to hear, assures the success of the venture in a manner alike creditable to its projectors and the publishers, who have lent the aid of their facilities for its production.

Very respectfully,

J. M. SCHOFIELD,

*Lieut.-General U. S. Army.*

## Publisher's Department.

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**THE Cycle Show of 1897 in New York.**—A general inspection of the exhibits of the leading houses at the big cycle show in Grand Central Palace reveals the fact that the show is rich in novelties relating to minor details. The tendency has been to improve on old ideas, and it is obvious that much success has attended the efforts of the thinkers.

In frame designs few changes are to be observed over the familiar models of last year. It is evident in this connection, therefore, that a fixity of design has been reached and that nothing radically new in this direction may be expected, at least for some time to come.

As will be noticed in the descriptions which follow, the most important changes are to be found in the internal mechanism. These are worthy the attention of every rider who owes it to himself to know thoroughly every vital part of his metal steed.

The beautiful finish of the new models is another feature of the show that is worthy of special mention. Some remarkably fine effects have been secured in colors, and the fashions of the makers in this respect will be very likely favorably received by their customers.

\* \* \*

**The Tribune Bicycles.**—Ten Tribune bicycles, including single wheels, tandems, and a triplet, are shown by the Black Manufacturing Company, in Spaces Nos. 15, 16, 41, and 42. The models are finished in black, royal blue, maroon, and robin's-egg blue, and each color makes a very attractive finish. The special features of the Tribune are the cyclodial sprockets, the crank-fastening device, seat-post, converging bars, oiling device, pedals and the method of attaching the sprocket to the shaft.

\* \* \*

**The Hartford Tires.**—The Hartford single-tube tires, which enjoy a wide popularity, are exhibited in Spaces Nos. 204 to 206. It is claimed that these tires are the original single tubes, and the Hartford Rubber Works Company, the maker, has steadily adhered to its method of construction in the face of what was almost universal opposition during the early years of the manufacture of single tubes. The "quick-sealing" cement made by this company is a simple and practical solution of that bane to the rider, a puncture. Injected into the tire, it forms a plastic plug which effectually mends the tire, and is so easily applied that the veriest amateur can appreciate it. With this solution a tire can be properly mended in two minutes.

\* \* \*

**Sterling Cycle Works.**—The Sterling Cycle Works, showing a large number of models in Spaces Nos. 77, 78, 79, and Nos. 98, 99, and 100, regard as their special feat-

ure a corrugated hub. This allows a large number of spokes in each wheel. No single item of expense has been spared in this year's models, the best having been secured in every instance, regardless of cost. The new racer is a distinct model, constructed specially for track purposes. It has a three-inch drop to hanger, a shorter wheel base, a lower frame, as well as other features that will appeal to men of speed.

\* \* \*

**The Spalding Display.**—As usual, the display made by A. G. Spalding & Brother is very complete and among the most attractive in the exhibition. After making a careful study of the requirements of riders in general, and particularly of that class who ride solely for pleasure and consider comfort as the most essential feature of the bicycle, this house has prepared to meet the demand of this class of trade with the Spalding hygienic frame. This contains many features which are original with the Spaldings, and which are not to be found in the machines of other makers operating under the patents of the Hygienic Wheel Company. The structure has been simplified and improved wherever needed, particularly in the rocker joint at the crown hanger, which will commend itself at first sight. It is unusually strong, and is also adjustable for wear, and there is a lack of the usual complication to be found in most wheels of this description.

\* \* \*

**Military Folding Bicycles.**—A decided novelty in the show is the display of military folding bicycles, made by the Dwyer Folding Bicycle Company of Danbury, Conn., one design is similar to that adopted by the French army, and the other is like that in use in the Mexican army. A ladies folding bicycle is also shown, and this will be sure to attract much attention from the women.

\* \* \*

**Remington Special Models.**—Sixteen fine models comprise the exhibit made by the Remington Arms Company. The special features to which the company draws attention are the new and scientific construction of bottom bracket and sprockets. By this method of constructing these parts, the rider is enabled, by detaching the left crank (which is the work of but a few seconds) and releasing a nut at the lower side of the bracket, at once to remove the axle and the entire interior, leaving nothing but the bracket forging. The axle used is of the single-piece pattern, and by the method, as explained, the same result is obtained as that secured by using the two-piece style. Both front and rear sprockets are of a cycloidal cut, with flange to carry the chain. This construction of the sprockets reduces the friction considerably, and also prevents the vibration which is very noticeable in a chain running over an ordinary sprocket.

\* \* \*

**Columbias and Hartfords.**—The exhibit of Columbia and Hartford bicycles this year is of an unusual high order of merit. It is one of the most complete in the entire show, comprising, as it does, almost everything that is used in these famous wheels. The refinements of detail and construction are easily noticeable, the assembled wheel presenting a very finished appearance. The accuracy and skill of Columbia mechanical methods are proverbial. Columbia methods are not the methods by which cheap bicycles can be made. They are part of the Columbia system by which a uniform quality is maintained.



The result is that Columbia bearings and frames give great satisfaction. This year's Hartford bicycles, which form the cheaper line of the Pope Manufacturing Company's product, are noteworthy in thoroughness of construction, excellence of material and advanced ideas in design and equipment.

\* \* \*

**Designs of the Overman Company.**—Some particularly fine designs in wheels are shown in the line exhibited by the famous Overman Wheel Company. Many improvements are to be noted, among them being the enlarged tubes in upper and lower rear forks and upper forward tube; also in a new saddle-post connection. The company assert, and declare they will demonstrate, that no other bicycle in the world can show such a record for quality of material and workmanship as the Victor. Crucible steel drop-forged connections and well tempered parts are the keynotes of Victor quality and construction. In the Victor bicycle, the nickel, paint, and enamel cover no flaws, conceal no castings and case-hardened cones. From tires to saddle, from rims to post, from cranks to bar, from balls to grips, the structure is made in one factory. The ladies' wheels turned out by this old house will appeal very strongly to the fair sex. They are particularly attractive, and, of course, in workmanship and appearance they are strictly high grade.

\* \* \*

**Wolff-American Wheels.**—Beauty of outline and rigidity of frame are two strong points in the Wolff-American wheels for 1897. The frames are built with peached tubes, which gives the rider a proper position without the use of the forward seat post. Instead of forgings or stampings, tubing is used for all connections, the frame being joined in a peculiar manner which renders a broken frame an impossibility. The fork sides are not reinforced, but are made of heavy tubing, with the gauge swaged between from the crown to the tip. This prevents the crystallization made possible by the ending of the reinforcement, and the vibratory springs are diminished gradually without shock. A greatly simplified method for attaching the cranks to the axle is employed, and to remove them is only a matter of a few minutes. The axle has tapered ends, with two parallel and two concentric sides, which fit snugly into the aperture of the crank. The bearing adjustments are devoid of complications, and to manipulate them it is only necessary to loosen the outside nut on the lower side of the wheel. The sprockets are detachable both front and rear. They are of an ornamental design and accurately cut from the finest of steel. The Duplex, which attracted so much attention last year, contains many new features.

\* \* \*

**The Grand is Popular. William G. Leland, its Proprietor, is Warmly Congratulated.**—The Grand Hotel, at Broadway and Thirty-first Street, is rapidly becoming known as one of the most thoroughly equipped, as well as one of the most popular in the metropolis, and its proprietor receives frequent and warm congratulations upon his marked success.

When Mr. William G. Leland came into possession of the house two years ago he had much of it remodelled, adding about forty rooms to its former capacity. Notwithstanding the increased capacity of the house, it is a frequent occurrence lately that parties arriving late in the evening cannot find accommodations.

The Grand Hotel has its own electric, refrigerating and ice plants, modern plumbing, hot and cold water in every room, and is, in all respects, "up to date." No hotel is more desirably located for family and transient guests.

The Grand still continues to be, as in the past, the favorite stopping place for Army and Navy officers and their families while sojourning in New York.

\* \* \*

**The Shirt Question.**—The shirt question is an important one to every well dressed man. Just how important it is he never fully realizes till he has the opportunity of comparing a really satisfactory shirt with one not quite so good.

Satisfaction is a good thing and worth going far for. Shirt satisfaction is only secured after somebody has done a lot of thinking and figuring.

The man who makes the right sort of shirts is the one who looks at the making from the wearer's standpoint. He makes a shirt to wear—not to look nice in the box or to sell at a certain price. He considers that a man likes to stretch his arms occasionally without restraint or rips. He knows that a shirt ought to fit snugly in the neck and bosom, and no place else. Fit in a shirt means the proper snugness and looseness. You can't get these things in every shirt shop you come to. And that's just the trouble about most shirt purchases. They are made "most any place."

There's an impression in many minds that "shirts are shirts." It's a mistake. Some shirts are "Keep's Shirts." And thereby hangs a tale.

When a man once wears Keep's shirts he is seldom satisfied with anything else. The uniform satisfaction afforded to wearers of Keep's shirts is somewhat remarkable, considering the fallibility of all human effort. Ninety-nine men's perfection might not please the hundredth man. Satisfaction is getting what you want. That is what the Keep Mfg. Company of New York give their customers—what they want. That is what they want them to have—that, and nothing else.

If a mistake should ever occur, they would much rather have it pointed out than to have their customer nurse his dissatisfaction into antipathy. They stand always ready to remedy mistakes with perfect shirts, or with money.

Their custom shirt factory is said to be the largest in the United States. It is operated with such perfect system and economy, by such skillful labor, that they are able to supply the very highest grade of shirts at prices most moderate. They have been making shirts for the last thirty-two years, and what they don't know about shirt making isn't worth knowing. Their line of fancy shirtings this season is larger and better than ever before. They mail samples with full particulars upon request. A visit to their establishment at 809 and 811 Broadway between 11th and 12th Streets, will fully repay anyone for the trouble. Even if you are only curious, they will be glad to show you their goods and methods.

\* \* \*

**The Fountaingrove Vineyard Co.**—The wines of this company have found favor with the officers of the service, there is no doubt about this, for the orders from post exchanges and from individual officers of the service prove this fact. It seems, therefore, to be unnecessary to give more than a slight reference regarding them.

As the Department of Burgundy—so prolific in vineyards—possesses its two or three châteaux that stand out illustrious and distinct in the superiority and excellence of their products, so do the Fountaingrove Vineyards hold a unique place of honor and distinction amongst the wine producing districts of California.

It is now demonstrated by the corroboration of scientific analysis together with gustatory and hygienic evidence that these mountain wines from the Fountaingrove estate—well ripened and matured—contain every essential quality which characterizes the high grade

vintages of France and Germany and possess the merits which distinguish the *grand vins* of those countries.

By the various Post Exchanges and Officers' Clubs these wines have been received with great favor. The attention of officers is hereby called to the fact that in Departments where Post Exchanges are not handling wines at all, this company can easily supply them direct with these choice beverages.

Samples furnished upon application to the Fountaingrove Vineyard Co., 58 Vesey St., New York City.

\* \* \*

**Parke, Davis & Co.**—This well-known firm, manufacturers of drugs and chemicals at Detroit, Michigan, patronized by the service for years, have secured the services of Dr. A. E. Dickinson as manager of the Department of Digestive Ferments. Dr. Dickinson, well and favorably known among the officers of the Army and National Guard, has recently resigned the position of manager of the Cudahay Pharmaceutical Co., which position he has held during the past five years.

\* \* \*

**Small Steamboats. Why Some are So Much Better than Others.**—Referring to small craft in particular (25 to 150 feet) it will be found that the most successful are fitted with modern marine steam machinery built for that particular hull by some one shop.

The builder of the complete machinery "outfit" making it all and not sub-letting parts of the job to various shops) furnishes the boat builder with reliable details as to weights, and scale drawings showing dimensions and arrangement of the important parts, on what amounts to the same basis, that is the rule in constructing large vessels, all of which is instrumental in producing a perfect craft. Thus the various parts, connections and fittings are suited to each other, and to the hull, all in exact proportion to the power, steam pressure, strain and maximum work which the boat may be called upon to perform.

Even boat builders and engineers of experience would, on investigation, be surprised to learn how few concerns there are who actually build the "complete outfit;" many sub-letting the work among different shops.

For the entire district tributary to Chicago, including the Mississippi Valley, there is but one company (Marine Iron Works, Chicago) who build all of the described machinery outfit, and making it their exclusive specialty, fully cover the line referred to, in propeller and paddle wheel machinery, condensing or non-condensing, as may be needed.

In the work described, the demand is so limited from any one district, that those giving it their entire attention, as is the case with the company named, must reach to distant points in order to justify the outlay required for facilities, patterns and equipment that are needed to keep pace with the varying requirements. It is manifest that each job has to be built to order to meet such needs, and that the designer and builder of the machinery outfit, be experienced in the construction and operation of steam craft.

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Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"An Entrance Fee of Five Dollars (\$5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership and on the first day of each calendar year, thereafter, a sum of not less than *Two Dollars* (\$2) shall be paid as annual dues. Annual dues commence on January 1st in each year."

NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor. Yearly dues (\$2.00) include Journal.

Changes of address should be reported promptly.





# Prize Essay—1897.

I.—The following Resolution of Council is published for the information of all concerned :

*Resolved*, That a Prize of a Gold Medal, together with \$100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and \$50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.  
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September 1, 1897*. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.

In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention ; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1896, for the Prize Essay of 1897, is

“BASED ON PRESENT CONDITIONS AND PAST EXPERIENCES, HOW SHOULD OUR VOLUNTEER ARMIES BE RAISED, ORGANIZED, TRAINED AND MOBILIZED FOR FUTURE WARS.”

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1897 are :

GENERAL WESLEY MERRITT,  
GOVERNOR U. A. WOODBURY,  
COLONEL H. W. CLOSSON.

JAMES FORNANCE,  
*Secretary.*

GOVERNOR'S ISLAND,  
Nov. 1, 1896.

JOURNAL  
OF  
THE MILITARY SERVICE INSTITUTION  
OF THE  
UNITED STATES.

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*"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."*—SHERMAN.

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MAY, 1897.

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NO. LXXXVII.

**First Honorable Mention.**

THE PROPER MILITARY INSTRUCTION FOR OUR  
OFFICERS; THE METHOD TO BE EMPLOYED;  
ITS SCOPE AND FULL DEVELOPMENT.\*

BY FIRST-LIEUT. R. G. HILL, 20TH U. S. INFANTRY.

"Complaining profiteth little;  
telling the truth may profit."

CARLISLE.

THIS is a timely subject. It is one to which officers can well give their best thought; it is one to be sincere about and to say of it what we think, and through an interchange of opinion those who are really in earnest can at least come to a general conclusion as to what is best.

The subject is one to be approached reasonably and not dogmatically. We should solve it on its own merits, on the material we have in our body of officers, on their mental and other qualifications, on the qualities and acquirements necessary to encourage and develop in them, on their relations to the people of our country, on what we in this country have to do with, and accomplish, and not what some other country has. Of course we want to know what other armies are doing, and that is a valuable guide if we do not become mere imitators. Let us imitate their essen-

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\* Essay completed August 20, 1896.

tial results, relying on our conditions and not attempt to misapply methods which have no meaning with us.

We want a system which will tend to encourage, with breadth of mind, a knowledge of professional detail, which will help in creating practical soldiers and educated gentlemen, not fussy theorists nor military pedants. We want substantial practical knowledge, and as much cultivation beyond that as officers may take unto themselves. The system cannot make the men, but it can furnish them the opportunity for making themselves. We do not wish a system which shall attempt to cast all in the same mould, but which shall have some uniformity in giving to all the knowledge of practical detail an American officer should have and at the same time not rob him of opportunity for as high development as he can attain.

While there are without doubt certain changes which can come about only through legislation, which would increase the efficiency of the line of the army, the writer proposes to deal with this subject first on existing conditions, and then endeavor to show how the question would be affected by certain changes. It is further proposed to limit the discussion mostly to the question of our line officers.

The subject is a timely one now on account of the concentration of our troops at larger posts. But let us not plume ourselves on being so much better off. Unless something else is made of the advantage than is being now made of it at most posts we will probably suffer by the change. I mean just this, that the younger officer of to-day has less valuable experience than formerly, when he was thrown into all sorts of positions of responsibility, such as the various staff positions at a post, more frequent command of his company, if not for administration at least at drill, much detachment duty when he learned to act for himself and look out for his men, to find his way about—very often having actual Indian fighting, and in any event responsibility. There were many things about the old conditions which had their drawbacks. Too protracted and continuous an experience without much study to keep in contact with modern military methods tended perhaps to develop more the qualities of the mounted policeman than of the educated soldier, but it did develop self-reliance and the habit of thinking for one's self. It was the school in which Grant, Sherman, Sheridan, especially the latter, and most of the successful generals on both sides during

the Civil War spent much of their early manhood. In some ways it is going to be difficult to replace it by any system we can introduce at our large posts. While it is probably not true at all of our posts, I believe it is at most that the only direction in which they have attained increased proficiency is in that of close order drill, and to some but by no means a uniform extent in field and battle exercises, where the men are really taught less of value than they were in actual field duty on the frontier. We have our examinations for promotion, but officers were studying before that was brought about. Indeed, I cannot see that young officers are studying harder than they were ten or fifteen years ago. There is however, without doubt, more study in the army now than then in all grades. We have our lyceums, where many good (and bad) ideas are put forth, and find in the summer that even when the opportunity exists the ideas are not put in practice. We have recitations, a school in which no one ever becomes proficient. The subjects on which we are examined for promotion are well selected. A thorough practical knowledge of these subjects, with some other practical work, would develop the quality of officers, generally, perhaps as much as it can be developed by a system which must have certain limits and not attempt too much. There are many subjects on which a theoretical knowledge alone is of little value. We are apt to see such knowledge in certain directions actually placed above the ability for work in the same field, and the latter treated as a matter of little value compared to the ability to talk or write of it. Our whole system is running us too much into theoretical knowledge. I do not wish to be understood as decrying theoretical studies. One must study, read and think much, if his judgment is to become ripened. Sound theory and successful practice are constantly reciprocal in their operation. It is by means of a deep basis in theory that an intellectual man passes in a shorter time to successful practice, and because of this basis he is equipped to meet contingencies which upset the mere rule-of-thumb man. But there is a vast difference between the acquirement of sound theoretical knowledge through study and thought and subsequent application, and the obtaining through memory alone of a mass of stuff called knowledge. What we know as the purely theoretical man is the one who *seems* to know a great deal but can never do anything well; and the real difference between such a man and the purely practical one is that the former gets everything he knows from books, lets



those who have gone before do all his thinking for him, while the latter rejects past experience and must think out everything for himself. The former is dangerous because a fictitious value is often placed on him ; the latter is apt soon to find his limitations, but within them he is usually valuable. His power of thought, of planning his efforts, is altogether more to be desired than the mere copying of the other. It is clear thought that should be wanted everywhere ; it is the thing which has raised us and keeps us above the condition of the savage. We want above all things in our officers the qualities of thinking, of planning and devising, we want ready men with as much real knowledge as they can stand but without too much erudition.

It is thought and activity which produce both great and small results. It is the unthinking man, whatever his degree, whatever his technical knowledge of certain things, who flounders about in all he undertakes ; he sees not the object it is necessary for him to accomplish and devises not the means for its successful termination. Because he uses many means good enough in themselves—for he learned them from some one who could think—yet wholly misapplied, he still maintains a reputation of some sort and continues misdirecting to the end. We often hear the remark “ Yes, so and so has good executive ability, but does not know much.” As a rule he knows more than is always appearing on the surface and knows very much in being able to use the head placed on his shoulders—not merely as a thing to be stuffed at random with the contents of books, but as an organ to be put to work on whatever matter it is charged with managing. I repeat that I am not arguing against hard study. He is not the best man who does not find resource in books—it may be his principal one without injury. It is the slavish dependence on them and on the thought of others which destroys the intellectual strength of men. There is not really too much theoretical knowledge required of our officers—the point is that it is not coupled sufficiently with the practical, and the danger is of officers losing sight of or never learning the real value of what is studied. It is rather a remarkable thing that in our service we are receiving according to a prescribed method practical instruction in Signalling and First Aid, while the three subjects of tactics, of field engineering and topography are practically neglected. The subjects taught are useful, but most military men will probably agree with me that the others are more valuable to a line officer. One might indulge in

the shrewd guess that we have a signal and medical corps, both organized and desirous of helping us out in our work and creating as many assistants as possible. Our engineer corps has been engaged mostly on civil works—doing it all well and creditably, and has not shown the enthusiasm of the other corps in spreading knowledge. Our tactical department, is presumably ourselves,—the line. Therefore I am silent, at least here where the other departments are in question. I do not think we need the fatherly superintendence of any of the staff corps to obtain what we need in our profession. In first aid the lectures by the surgeons have certainly been interesting and instructive and it is the best source for our knowledge. In other matters we can well take care of ourselves. But we must be about it, or the various staff departments will have the whole army at work on their special lines and crowd out more and more the military features. The substantial knowledge among our officers of military and other law is the best example of the value of practical *versus* theoretical training. Our officers have much real law work thrown on them as members of courts, judge advocates and counsels and the result is that the practical work gives them something of an insight into the beauty of the law and a large number go on way beyond what is required of them, and become really well versed, not perhaps through an ambition for the Judge Advocate's corps, but as an intellectual satisfaction. As a fact it is not the officers well read in the law who make the most petty points in practice, and I would not diminish the reading of law among officers, but rather increase it among intelligent men of all conditions, as no study tends more to broaden the mind, to cultivate a high sense of justice, a love of order and respect for authority, and for American and English institutions, which means patriotism and pride in our race. It is essentially one of the practical details of our profession, and a most important portion of a gentleman's education. If officers could be attracted by more practical work into other essential details the same amount of ability would go into them.

Much military work in time of peace must be largely theoretical, but it can be carried on with some logic. Everything we have should be as practical as it can be made with the means at our disposal, and unless one endeavors to reduce all purely military studies to something like a practical basis, to a thinking instead of a mere book knowledge basis, he would do better to

throw his books aside, get a stick and try to whittle that at least into some sort of shape. It is a truly serious question in this army of ours to-day, the one of practice *vs.* theory, and one to which those responsible may well look at earnestly unless they want our officers to bud into a corps of pedants instead of ready capable men in their profession. It will grow worse instead of better if decided means are not taken to correct it. We should not have mere pedantic knowledge on a subject placed ahead of real ability of accomplishment. It is always much easier to learn a few things about a subject and impress people by talking of it in set phrases than to really grasp it so that it can be used. The difference between the two sorts of knowledge is important. If one really obtains a thorough knowledge of anything it is always a part of him, he can lay his hands on it at short notice without keeping it constantly in his mind. This knowledge can never be obtained wholly from books. It may come largely through them, but in all fields there must be either practical work or careful thought. Once well obtained many practical matters in our profession can be thrown aside and resumed when needed. Everyone who has become once thoroughly familiar with drill, knows that he can leave it for four years and resume it without difficulty in a few days. It is the same with many other things after proficiency is once well attained—the subject not merely dabbled with, but once learned with thoroughness. These matters do not have to be bothered with at all times, and there is abundant opportunity for studying more difficult matters in the profession, and also for obtaining general cultivation. Indeed it is probably better for an officer not to yield himself too entirely to strictly professional study, but to find resource largely in general reading. One can soon become a narrow dry bones by never going outside of purely military matters.

There is a danger of going into too much work, too much with the means at our disposal, and so much that officers will be prevented from developing strongly in intellectual directions. There is a fair limit to place on the attempt to develop matured men by mere order, by prescribing what they shall or shall not study. Beyond a certain point it is positively harmful to enforce too much instruction. Those who can make use of it will get it whatever system is prescribed, and will be hampered by being compelled to follow on too rigid lines. Those on whom instruction is forced, beyond a reasonable point, will not retain it, and

they and others will obtain a false idea as to their knowledge merely because they have been put through a course.

On the part of some there is a tendency to copy blindly from the armies of Europe, and especially of Germany. We can learn from them, learn much, but do not have to copy. There is no greater admirer of the Prussian system for obtaining a great army than the writer. No one who has watched it at work, who has read of its exploits and visited some of the fields where it has won undying glory can but be impressed by its efficiency as a fighting force; cannot wonder that the scions of its noblest houses are willing to go out as file closers in that splendid host. It is the finest result that has been obtained, so far as history tells us, in the matter of utilizing what is best in a great body of men. The German army is the heart of the German people. The mission of the German officer is two-fold,—in time of peace to train the youth of the country to the profession of arms; in time of war to lead those trained men to battle. These objects are fulfilled in the most direct and practical manner. The youth are placed under their entire control for two or three years, each year about 70 recruits are taken into an infantry company and the same number go into the active reserve. In case of war the place of each officer and man is known—the several parts are immediately fitted together and the great engine goes to work. In our army an average of about 14 new men\* come into a company each year, and the same number goes out by discharge, retirement, etc. Our system of recruiting during peace is not going to be changed materially. No one expects or cares to see the continental method of conscription introduced in this country. We do not want it nor need it, and should not try to imagine that our 25,000 men *and officers* are to be expected to fulfill their mission in exactly the same way as the great armies of Europe.

If we are to imitate the German system, let us imitate its essential features, viz.: that their officers' duty is to instruct the youth of the land in the profession of arms and to qualify themselves to be the leaders of the trained men in time of war. The latter has frequently been the mission of our Regular officer in the past, and the former is becoming the view more and more as our officers have been relieved from scattered frontier service, and are being placed on college duty.

Before taking up for consideration in detail a scheme of in-

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\* Computed from Adj't Gen's Rep. 1895.



struction let us look fairly at the material we have to work on. The officers coming into the army to-day are mostly from West Point, and those from the ranks who pass a quite rigid examination. As most appointments are from the Academy, they are to be chiefly considered in a comprehensive scheme. Many of the non-graduates will doubtless excel many of the graduates; in individual instances they may stand preëminent among their contemporaries. While we have much material among those who have come in from the ranks and from civil life since the war which could not have stood up under the present examination for entrance, it is fair to say that the personnel consists mostly of picked men. The weeding-out process has been pretty thorough before they were allowed to enter. Because a few have little in them it is not a guide for viewing the entire body. Many show less than they really possess through the inability of the present system to develop quiet, unaggressive men. It must be remembered that only one in between two and three who go to West Point for entrance succeed in graduating. There is a foundation laid there, and those who join in other ways have shown enough pluck to make the prospects for the future of our small army a brilliant one, if some comprehensive and intelligent system of instruction can be found and adopted. Even with the system under which we exist to-day—there are enough among our body of officers who will work on good lines in spite of it.

Beside their intelligence there are some other important qualities existing among our officers: As a rule, there is courtesy, a high sense of honor and of duty, a love of country, a respect for authority. We are not a body of saints by any means, but it is not the minor faults of men so much as their lack of distinguishing virtues which is a fair basis for estimation. There are, without doubt, some which our profession and any other could well do without, but the military virtues strongly pervade our army. They go to the foundation of all that is good in an army and could not be replaced by the finest system of instruction.

There is yet another important fact to be considered in the treatment of this subject of instruction; it is of the highest importance. We are a nation of about 70,000,000 people, with a small army. We are immensely wealthy, and while we have been engaged mostly on the arts of peace, and military knowledge is not widely disseminated, the indications of the past year show

that the people are as little averse to war as any on earth. If this means anything to us it must mean that upon each of us devolves a higher duty than though we belonged to a large trained army more in proportion to our population, wealth, and firm attitude in foreign relations. This view of the mission of officers in case of a large war is one entirely sustained by our history. We must bear to the large forces raised at any time in this country somewhat the same relation that the general staff does to the large European armies. The chances are more in favor of our needing a knowledge of all the arms, than the line officers in Europe. We have no real military staff corps in our army. None of the corps, the Adjutant General's, inspectors or engineers receive the training of staff officers. We certainly do not want more staff. In fact it is wholly doubtful whether a general staff corps could be well organized in our small army in peace and with any degree of safety be given the power of the general staff in Europe. In the first place our military has less control over its own appointments; in the second, a corps now organized would, if built up solely on supposed merit, even most conscientiously, rest on too theoretical a basis. In fact, we would find it difficult to create or use a permanent general staff in our army. It is better to give line officers opportunity for acquiring all-around accomplishments in the profession, make them *in addition to what they are now*, good tacticians and at least fair military engineers and topographers, and practical, not theoretical ones. Cultivation in an eye for ground, ability to seize readily a tactical question, quick judgment in the field, and knowledge of the many practical details of military engineering, how to make gabions, fascines, etc., throw bridges, select trace for intrenchments, handle working parties, etc. How to read and make maps and conduct reconnoissance. It is in these and other all-around accomplishments, not superficially acquired, that the regular officers can make themselves felt in the raw levies, whether on the staff or in command of regiments or higher organizations. By knowing these details, so useful for his own military training, he can find out and utilize talent in the volunteers. We hear it said that we want to teach men to be good company officers and not colonels and general officers. The first is admitted, but if, in addition, every lieutenant in our army could, after a few years, also be fitted to command a regiment or something higher, the mission of our army would be constantly fulfilled. All but a few

will be colonels before they retire and many may reach higher grades. The best way to fit our officers to be either good lieutenants, colonels, or generals, is to give them opportunities for practical development in all the details of the profession. There is probably less difference than we sometimes think between the ability to command well a patrol or an army. The only estimate in any case is by the success obtained and the amount of judgment, energy and sincerity thrown into the work. It is surely more honorable to do either well than the other badly.

While taking the broader view of the duties of our officers we must not lose sight of the fact that our army is still liable to be called out to take care of the Indians, and that it will be used more or less to prevent or suppress disorders sometimes accompanying great strikes. No one can say that these duties have not as a rule been well performed. The case may arise of the Regular army being filled up and going out as a body by itself without the assistance of volunteer regiments, but if a serious war occurs the Regular army will be but a small part of the entire force.

Besides prospective duties in war, there is one great duty in peace—that of instructing the youth of our land in military matters. Some of this duty is performed directly with our troops as with the large standing armies of Europe, but as shown, the number reached is comparatively small; some is performed in connection with the National Guard, but this can be largely only supervisory, as our connection is not sufficiently intimate to enable us to be instructors in the real sense of the word. The remainder is performed in connection with our colleges. In some respects it is the most important duty we can have devolve on us in peace. Sound and thorough instruction there means much. It is instruction given to men of education, the class of men from which when fitted otherwise, the officers of volunteer forces will be selected, men who may in the meantime become officers of the National Guard. As these boys go immediately from this instruction into civil pursuits, it should be highly practical and have little to do with text-books. They will throw these aside with their other books on leaving school. Things which they are actually required to do will be remembered. Therefore officers should be well prepared to give this instruction, to make it forcible and interesting from their own fund of knowledge and experience. The subject of college duty is referred to again further on.

There is not space here to set forth systems of instruction of officers of other armies, and it is wholly doubtful whether we can do much by following them. To summarize, we do not maintain a force or have a system of recruiting which enables us to work on our men in the same way; we have no general staff and it is doubtful whether we need or could use one, and Regular officers must so far as they can make up for the deficiency; we are a small force in comparison to the wealth and population, and the possibilities for being called upon at any time to exercise higher commands is greater. In fact our conditions, our relations to the country at large are different from those of any of the large armies. It is these conditions and not theirs we have to meet. It is therefore perhaps best to take up the subject as to what our officers should know in a manner independently.

All will agree that line officers should receive practical development in the following: How to take care of, discipline, command and instruct those under them, how to exercise properly at least the functions of one's grade, and to be ready for promotion to the next grade; all this either in peace or war. This is the narrowest view that can be taken. In addition is the necessity of being prepared to help in the great task of getting into shape as soon as possible a large volunteer army, and to perform the duties of any command or military staff position to which we may be called. To attain this result it does not seem desirable to teach directly the special functions of a general command; officers will learn those things if qualified to exercise them. The best way would seem to train thoroughly in all the duties of a regimental officer and in certain practical knowledge which not only assists in the creation of tactical readiness on the field of battle, but which we should be familiar with on account of the non-existence of a trained general staff, and of a ready organized engineer corps of a size proportional to a large force. Other matters can well be left to special schools and to the officers themselves. The following is therefore suggested as the scope of training for the body of our officers:

The care of men in camp and garrison involves a knowledge of considerable detail. It is their proper care in the field where the most difficulties are met, where ordinary routine is upset, and contingencies will be best met by those best informed, and with the most practical experience. This is a field too where regular officers can first make their influence most felt in dealing with



raw troops. The proper handling of the ration involves an actual knowledge of how to eke it out and cook it. While the details of this will, of course, fall on an enlisted man, the officer should understand practically the actual cooking, to see whether it is done right, and correct mistakes. Both the boys and girls of many of our wealthy families are taught to cook and there are many officers in our service to-day who have not been above learning how to cook the ration. Besides this are the many details in making camp properly, under all sorts of conditions, construction of ovens, sinks, shelters, etc., matters of hygiene both as applying to the camp and to the person of the soldier. First aid to the injured is in this category, but it has been given undue importance ahead of other matters in recent orders bearing on instruction.

Command and discipline involve much practical and theoretical knowledge. First of all a knowledge of men, firmness, justness, and a strong strain of humanity, knowledge of administration, of military law ; we all know that with most men, if a reasonable amount of foresight is shown in making provision for their comfort, or rather for the absence of unnecessary hardship, and they are treated justly, there are few sacrifices which they will not share with their officers. It is the indifference of officers, whether arising through thoughtlessness, incompetence or selfishness, which as a rule brings insubordination and mutiny. Coddling is not only wholly unnecessary but harmful. It is only reasonable foresight, care and justness that the body of men expect or care for.

How to instruct officers or men is an important qualification. Knowledge of the subject must be presumed, but an absence of judgment, sincerity and earnestness is a worse fault than some ignorance. We see some who know their drill-book by heart, who never give a wrong command, who accomplish few results through an absence of the above qualities. It is encouraging that the board which during the last two years has examined the majority of officers coming up for promotion has considered their bearing and manner of giving commands in marking on practical examination in drill.

To obtain the best handling of men in time of war, an officer must be thoroughly familiar with advance and rear guard duty, outposts, patrols, in fact, with all that general division of the art of war known as Security and Information. To perform these

duties he requires habits of self-reliance, quick judgment, the faculty of finding his way about country, of rapidly observing faint indications, a good memory for ground, physical endurance, and tactical knowledge, frequently of a high order even in a junior with a small command. He also wants to be able to report what he has seen, and the better and more rapidly he can make a map to illustrate this the more valuable his work. A knowledge of the language of the opposing forces, or of the people of the country where operations are going on, is of course of high value.

On the field of battle the more good sound tactical knowledge existing amongst the officers the better. The only sound tactical knowledge is that obtained through practical study with reference to ground; while this can be carried on to a great extent in the study by the trained mind, with reference to maps or by picturing an extent of country, one to use a map intelligently should be able to see in his mind the ground when he looks at the map. In fact, practical knowledge of tactics and of the duties of security and information are so dependent on a thorough knowledge of the military capabilities of ground, and the ability to take into the mind rapidly a piece of country, that training in this faculty is of the first importance. It can be obtained of course by the voluntary self-training of officers, but I am convinced that the best way to obtain it is by *military* topographical work. Valuable as maps are for active operations, teaching officers such work only for the purpose of obtaining them, enters as a small factor compared to their value as a means to what is more important to the greater number, viz. : to observe ground closely and rapidly with regard to its tactical possibilities. A comparatively small number of officers can be spared for general map work in time of war, but all can frequently use the faculty to advantage on advance guard, outpost and patrol work. Moreover, those who can do contour work can read maps with more facility. There are still other considerations making topographical work valuable. It would give younger officers some opportunity to be separated from the leading strings of the company and other commanders; it will replace to some extent the old duties on the frontier where officers were thrown on their own resources in detachment work or in the staff departments, where self-reliance at least was taught. Moreover this is hard work if well done, keeps both body and mind employed, increases

powers of bodily endurance and quickens the perceptions. Making contour maps enables one to use more understandingly and less laboriously the maps of battle fields, and to follow the results with more profit. In fact, it is a most profitable military accomplishment from so many points of view that it has been a source of wonder to me for many years why comparatively so little attention has been paid to it. Poring over books and maps does not increase much the active faculties. This sort of work mixed in due proportion with out-of-door tactical studies and the mastery of books should produce good results where the natural foundation exists.

In connection with topographical work is that of reconnoissance, of seeing and reporting what is of interest in a military sense, and officers will probably be called upon for more work of this kind in time of war than for the production of maps. It has a more distinct value of its own than the latter, which as stated, has its principal value as an adjunct to tactical work.

The elements of field engineering should be practically familiar to line officers of our army. This subject is closely allied to those of topography and tactics, and it may be fairly said that he who does not understand the tactical possibilities of ground cannot make a good military engineer, and knowledge of field engineering is an efficient aid to tactical work. One may study these tactical possibilities without acquiring the technical skill of the topographer, but the three studies should go hand in hand. Napoleon says the best qualification for a good military engineer is common sense. Of course he presumed a technical foundation. It is quick judgment and an eye for ground that is wanted and which does not depend on an elaborate map and long and careful study in the closet. We know that during the Civil War Regular officers were used extensively to assist in engineering work, notably at the siege of Vicksburg, when General Grant called upon all officers having knowledge in this direction to assist.

Knowledge of our drill books, it is hardly necessary to say, is an essential amongst line officers. There is little to be said on this score, as proficiency exists as a rule, especially in the close order drill. With reference to the extended order, the spirit of the drill-book is too frequently not carried out; it is not merged into the true study of tactics sufficiently. As to the practical study of tactics, it is fair to say that a bridge engineer could as

reasonably omit the study of strains as for an officer of the line to omit the study of tactics. And yet an officer could get along pretty well in our army, have even some reputation for efficiency without any real knowledge on this important matter. Many, perhaps most of us, can look back through considerable service and recall few or no instances where the subject had been seriously approached at drills. Our drill regulations form a portion of our tactical training—an important portion—they are a means to an end, and yet we see them treated so much as the final end of tactical work. Were the spirit of extended order drill carried out real tactical work would result. As it is we go to two extremes. Much the same methods that must apply to the close order are carried into them. They are converted into purely mechanical evolutions, excepting that the men march at ease. We go through normal battle formations without reference to the ground in much the same fashion that we execute front into line; this is one extreme. The other is to get up a sham fight, in which ideas of tactical cohesion are thrown to the winds, where direction and control are lost. This is because the men in company, the companies in battalion, and the battalions in regiment have not been taught with deliberation fire discipline, the advance of a line which shall be at once cohesive and give the elements an opportunity to use their fire, and the minor accidents of the ground, nor the bringing up of supports with reference to their suffering the least loss, and having them there at the right time. The normal formations of the drill-book are only advisory, anyway, and the board it is hoped did not expect to do all the tactical thinking for the army until the arrival of another book. Indeed, the question of tactics cannot be placed between the covers of a book. It is one to be studied with reference to ground, to be practised with reference to ground, and it is as necessary for officers to be doing this as for the surgeon to study his profession with reference to the human body; more necessary than any one subject beside discipline, more necessary than “first aid,” more so than musical gymnastics, more so than signalling, more so than all the material perhaps on the pages of the text-books on which we are examined. It is far from my purpose to speak contemptuously of the text-books, but of the use to which they are put. In fact if an officer desires to acquire tactical knowledge to-day he must do it mostly by himself. We hear this attributed to lack of having large bodies together. We had best be doing at our posts with



what we have before raising the cry for concentration for manœuvres. In tactics, as in every other art or science, for that matter, knowledge of value must consist in laying firmly in the mind the deep underlying principles. Study of precedents helps to form these principles and to fix them in the mind, but beyond this it would seem wise in studying tactics to let go of precedent somewhat after getting hold of the principles, and store up in the mind in preference a large number of precedents from problems thought out on all sorts of ground on sound principles. The mind then will be ready to seize immediately about the best tactical solution when called upon to act quickly. In truth, an effective man will train himself to think, especially where rapid judgment is necessary, not how Napoleon, or Frederick, or Grant, would have done this thing, but how he himself will do it. He is the one to do it, not his great predecessors in the art of war.

Our tactical instruction is, it seems to me, the most unsound thing in our service. Indeed, to hear much of the talk on the subject and to see many of the methods used, one might grow to think, if he allowed himself to be influenced, that there is no such a thing as tactics excepting the close order drill and the purely mechanical performance of the extended order. We see companies going for months and learning nothing but the manner of deploying and assembling, without hearing the wholly important question of fire discipline more than barely referred to, and a battalion and regiment going, time after time, through the normal formation without reference to the ground. We see a whole regiment deployed as a firing line and supports, and advancing with accurate alignment over ground that could not be so used in actual conflict. We find, in order to obtain this alignment, that one company is halted in a hole from which it could not fire, and only a few feet behind a position from which it could, another is thrust a few feet beyond good cover from which it could also fire freely, to be exposed on a steep slope to full view and whence it is almost impossible to fire from the prone position. Supports go forward dressed on each other in the same way. When the rigid line is abandoned the companies are turned loose without reference to alignment or cohesion. The sending forward of supports seems not to be considered as a matter on which the ground may have some bearing, but the whole question is left to be solved by the normal formation of the drill-book. This all saves much thinking, but it is almost worse than no drill at all.

It teaches nothing, unless it be that there will be some awful blundering. There is such a thing as teaching fire discipline, teaching men to always aim at a definite object, to save their ammunition, to fire only when they can see something to fire at, to keep under the control of orders and obey visual signals ; there is such a thing as training a long firing line to advance on a general alignment as a cohesive line and yet allow each platoon or company to develop its fire and obtain some immunity from loss through accidents of ground ; there is such a thing as sending supports forward so that their formation shall be as little vulnerable as may be ; there is such a thing as officers being trained in the tactical possibilities of ground, not in fanciful theories, but in sound principles. It is an appreciation and knowledge of these questions which constitute tactical training. It seems almost absurd to indulge in a long argument to prove that tactics should be studied in the army. They are studied faithfully by many, but as a rule, they must carry it on by themselves, and excepting for their own satisfaction they are out of the swim compared to those who are satisfied to join in long discussions on minor points of the drill-book, well enough settled by the board. In fact, let a large amount of mediocre talent be spread out on paper or otherwise on the minor points of drill, and an officer can set up as a tactician. The writer believes in sharp, accurate drills, and would welcome a return to what we abandoned five years ago. It is not an objection to careful detail at all, but to mediocrity setting itself up as a tactician when it really never thought of the subject of tactics and cannot be made to think of it, indeed believes it is all between the blue covers of the drill-book. The book has faults, but the principal fault to be found is that certain good things in it are not in very large type and that company and other commanders are not positively instructed to follow them, and given to understand that they must.

Knowledge of the ballistic properties of the weapons to be employed by and against us, and to what extent these properties will be made use of by those handling them, study of fire effects and learning to make the most of and to avoid them, undertaken with reference to ground, makes up so much of tactics that no work on the latter subject can be complete which does not deal with the questions cited. It is about as important to know the effects particularly of shrapnel and machine-gun fire as of the rifle. The entire subject of fire effects is one which can be shorn

of much formula. A few simple tables, and the enunciation of a few sound principles, briefly discussed, is sufficient for officers if thoroughly familiar with them. Large books may be filled with elaborate and really valuable discussions, but such are not necessary for text books, and a comprehensive knowledge may be obtained without them.

There is another study which might be made compulsory amongst our officers. It is the obtaining of a good speaking knowledge of Spanish. Whether or not it should be made compulsory for all, it is important. This is hardly the place for a discussion on the future relations between us and the many Spanish speaking countries to our south, but who looks into the matter at all cannot but be convinced that there may be danger of complications at any time where the army would be used. The people of our country are not looking upon them with an eye to military conquest, and the writer does not mean to advance the opinion or desire that we will attempt to extend our domain in that direction. Great interests are being obtained by our people in Spanish America. The countries are rich and awaiting development, and the interests existing there now are nothing to what will be obtained in the coming years. We all know the utter instability of most of the governments, that foreigners with large interests rarely lose allegiance to their strong home governments. They sacrifice their political to preserve their civil rights. Without further discussion of the matter the plain fact stares us in the face that the interests of our people will have to be protected always. Such matters have been known to go outside of the hands of diplomacy into those of the army and navy. Without thinking of foreign conquest or bothering ourselves much on political matters it becomes well-nigh a confirmed duty for us as officers to make ourselves familiar with the language of the countries where the interests of our people are involved. May we never have trouble with any of them through a desire to interfere, and may they all be able to work out their salvation without our interference. But the army is kept for contingencies, and it is our duty as officers to view future contingencies and fit ourselves to meet them—that is all.

It is very doubtful whether it is necessary to enforce on officers generally much study in logistics and strategy, especially in the latter. Those who will need these matters will study them anyway. In fact, there will always be a very large number study-

ing in these directions, perhaps more, under a purely voluntary system, than would be studying tactics, or the practical details and accomplishments which really speak for the efficiency of the military force. It may be said that there are probably fewer difficulties attending the study of strategy than of tactics, as taught in any book. It is certain that the latter require more practical training, and it is even more certain that more officers will be required to need this knowledge. Perhaps a strategist will now and then be developed who is weak in tactics. However, we need not consider such an exception in a general scheme, and it is probably safe to leave this study of strategy to officers themselves, or to a war college, and the same may be said of logistics; this at least for the present until it is demonstrated fully that the main body has come up to a certain standard in these minor practical details.

We now have signalling practically taught. It is difficult to see wherein the subject is of great importance, especially as compared with others. We have a special signal corps with a brigadier general at its head, and with the remaining personnel. It would have a large amount of almost ready-made material to draw upon in time of war, better than anything to be found in the army, and more available. We would not want to spare a single officer trained to command on the field, or a single man trained in discipline and the use of the rifle for the signal corps. In case of riots in cities it would be convenient, but even here we do not want to spare men from our small commands. In the cities our signal corps would handle the work, and entirely, and we would object to details being made to help it. Its convenience where a small command is strung out along a long line of railroad to keep it open, the wires being down, is perhaps sufficient to keep up the instruction we now have in signalling, especially as it is the one subject outside of parade ground drill and target practice in which we now have a practical examination. It might be valuable on the cavalry screen, but probably certain conventional signs would be used. Telegraphy might be valuable to an officer seizing a telegraph office, if he had no telegrapher with him, but it is questionable whether for some remote contingency it is well to crowd out more important things, especially for American Regular officers who will have their hands full in time of war.

Beside the mental training of officers, comes in the question



of the physical. It is one with which orders can have little to do after finishing with us at school, excepting to enforce that company officers shall in the matter of riding, running, jumping ditches, escalading walls and marching, be able to do what the men can. Great powers of physical as well as mental endurance, and actual indifference to hardship are certainly valuable qualities for an officer to have. These are largely questions of will and temperament.

The foregoing matters are mostly such as pertain to all line officers. In addition, the cavalryman must understand the horse, how to care for him, train him, know when to make the best use of mounted action and when not to use it. The cavalry officer will have more work pertaining to security and information, more rough topographical work, and in field engineering more hasty demolition; but less probably of other engineering work than the infantryman. The light artillery has its horses and material to care for, the heavy artillery the handling of complicated machinery. So far as tactical training is concerned all arms should understand well the functions of the other two. In fact, all our officers would be well off if they could receive training as cavalry, light artillery and infantry. As this would, to be carried out properly, involve legislation, the question is only touched upon in this place.

As to the best manner of carrying out the instruction in the various practical details referred to above, the writer ventures some suggestions.

A large number of these matters should necessarily be carried out in the company, some by direct instruction, but largely when thus obtained by observation in garrison and the field. As to the cooking and management of the ration there could be some study encouraged on the simple chemistry of cooking and sufficient inspection of messes by the captain, accompanied by the lieutenants, to enable them to understand a good deal of practical cooking—this should be done especially in the field, where in conjunction with some work in garrison all soon learn according to their aptitude the numerous minor points in taking care of men. Probably the best means of instructing officers and men in the matter of being always ready for the field is to order organizations out on short marches on an hour's notice. By always expecting it they will be always ready both as to matters of equipment and physically. Our service is for the most part not deficient to-day in this

duty of being able to look out for men, horses and material in the field. The question is one to be solved now mostly by practice marches. The soldier's handbook covers many of the essentials. Experience, observation and forethought, reading to obtain the advantage of others' experience, are of course the means of obtaining efficiency. Although this heading is discussed first as being about the most important, the writer will not go into further discussion of it, believing that it is fully appreciated.

As to company papers, it is a good plan to insist on a lieutenant in his first service making out those for a full quarter, including a quartermaster's return, with little assistance. He thus obtains at least an insight into the whole scope of muster rolls, returns, payments and property accountability in the most direct way.

On the subject of drills and tactical instruction there is much to be said. While many in the army are not satisfied with our drill regulations, there seems more room for criticism on the failure to carry out their spirit than in the regulations themselves. Without entering into a discussion on the merits of these regulations, it is proposed here to suggest what seems to the writer the most important features of drill and tactical instruction.

Practical work in drill regulations is of course carried on entirely in connection with the men, in other tactical work much of it should not be. As to the close order drill we are, as a rule, proficient, and so are our organizations. There are a few things, however, to be said about it. There is a tendency in some cavalry organizations to neglect the dismounted drill, and it is perhaps growing. Without disputing the certain value of the action of mounted cavalry on the battle-field on many occasions, it is equally certain that they will also be compelled to manœuvre on foot, and should be trained to it. The foot batteries receive such instruction perforce for the uses of ceremony. While artillery will be used as infantry in time of civil disorders, it needs little instruction of this kind for actual war.

The general faults in our instruction in extended order drill have been referred to. The drill regulations are sufficient guide for carrying out most of this drill in the company, excepting that too many commands are laid down for bringing a line to the halt and to commence firing. As soon as manœuvres of deploying and assembling are well understood, the work on varied ground should take place, and it should be enforced on company com-

manders. At every company drill at least one advance should be made against an imaginary position, and every man be required at all times to go through the deliberate motions of loading, aiming and firing, always at some object with the approximate range. Of all things the most important is probably to teach them to fire at something—never to pull the trigger unless the rifle is aimed at something to indicate the enemy. It should be repeated and ground into men until when under actual fire they will remember it if they forget everything else. Beside this is the effective and rapid handling of the piece—to teach them to do everything else rapidly and mechanically but aiming, and that to do as rapidly as possible, but deliberately. Much of this instruction should be given in the squad, especially the manipulation of the piece. The extended line should be drilled much in moving forward at double time and the run without disorder. Indeed, there is not sufficient double timing in our company drills and too often we find officers and men easily winded. These questions of rapidly moving forward in good order, deliberate aim at the enemy and controlling fire are the most important matters, perhaps, in the training of men for action, and they should be impressed on all officers as a part of their training. They should, moreover, teach the men to keep in touch with them by much use of the whistle and visual signals. Many act as though the whole subject of instruction in fire discipline is solved by that obtained in target practice. It is an efficient aid and that is all. It would, perhaps, be desirable if most of the known distance shooting, excepting at 200, 300 and 600 yards were eliminated excepting volleys as now prescribed, and an increase be made in the amount of skirmish firing. This and the volley firing are the real indication of the proficiency of the company for service, although some known distance firing is necessary. Yet a company might be trained up to do good work during a month, and if the principle of accurate aim always whenever the trigger is pulled be not inculcated during the remainder of the year, not do very good work in actual service. The question of teaching men to seek cover is not really important, but teaching them in the company to maintain a fairly accurate line and learn to drop in a position from which they can see to fire, is important. We have all seen at company and other drills men lying behind a bank from which they could see nothing but sky, listlessly going through the mechanical motions of loading and

firing. This is not usually the fault of the men. They should be always taught to drop as soon as they halt, and if halted behind a ridge somewhere nearly parallel to the line to move up to a point from which they can see, and if necessary rise to fire. Constant effort should be made to preserve alignment and distances, and to halt where the enemy can be seen, as there will always be sufficient individual talent displayed in the matter of seeking cover.

Advance guard, outpost and patrol work is perhaps best learned by the officer in instructing the men in actual work of this sort. While much of it should be given by careful instruction in the company working alone and against other companies, most of this work should be in connection with larger organizations.

Gymnastic work pertains essentially to the company, and ability to instruct in it enters of course as a company officer's duty. While it should be continued to some extent throughout the year, it should without doubt be mostly employed during the inclement months, and used out-of-doors mostly in the direction of running, jumping ditches and escalading walls, all really features of extended order drill. The same can be said of riding-hall drill, and in the artillery much pertaining to manipulation of the piece.

A large proportion of the practical work in military field engineering pertains to instruction of the men in the company, making gabions, fascines and other revetting material, making hasty intrenchments and other shelter, construction of simple bridges, when we have the material, are all things which the men should learn in the three years, and without a great expenditure of time.

So far as work in our companies and the teaching of our men is concerned we are almost as well off as though enabled to concentrate large forces for manœuvres. In fact, so far as much of our work as officers is concerned, we imagine more than is really justified that we could learn more if we could have those large forces. Let us do the most with what we have, not by imagining that the three or four hundred men we get out for drill at our regimental posts are three or four thousand, and scattering them over ground they would never be expected to defend or attack, but by using them right always. A force may be "imaginary or outlined," but if "represented," let it be one that could do some-



thing in the place it is defending or attacking. In matters of instruction we may require the officer to imagine that a great deal is going on away from his immediate vicinity, for example, that two hundred men on each side acting as advance guard have larger forces supporting them in rear, that an assault is being made by a long line and the force used is only a portion, that a position for defense is being taken up in the best way and that there are large supports and reserves behind, or that the force is defending a portion of a considerable line. The question of using a force in attack as a portion of a supposed larger force is more difficult, but it would be an efficient drill to deploy all the companies of a battalion, or of two and train them thoroughly in advancing as the firing line without supports against an outlined position, keeping up a general alignment on a directing company, fixing an approximate distance, as fifty yards, which they should not get ahead of or behind this company. Then each company could develop its fire, obtain such cover as it could, lie in wait if ahead under the best shelter, or run rapidly over the most exposed ground, and we would still have a cohesive advance, which is wanted. This drill would be the same in its general features on all sorts of ground, and should be frequent to insure the steady advance. It may be said that it is the only portion of tactical battle formations which should be normal, as the rest should depend solely on the ground; in other words, the feeding of this firing line, the bringing up of supports and reserves and of subsequent lines, should be regulated by the ground, depending always on the necessity of an ordered advance. Herein lies much of the benefit of thorough training in close order drill, and this question of adapting formations to the cover attainable or to the angle the ground makes with the line of fire, forms a large portion of the science of tactics. There is not space here to discuss to any extent this science, but I take it that questions of tactics can be studied only with reference to various types of ground, that it is useless to lay down hard and fast rules. Many hold that this question of taking men into action is inspiration which develops at the time. It is certainly more inspiration than the following of normal formations from a drill-book. The word has been discussed at such length as to its religious meaning that I will not involve myself in discussing it here. Call it inspiration if you will, but let us cultivate our inspiration. If we are not all to have it ourselves let us study into the logic of these matters.

Then when our more gifted brother officers give rein to their inspiration, which will probably not violate common sense, we will at least see what they are about and succeed in helping out the general result. Neither Moses nor Mahomet were men who sat around waiting to be inspired. There is much meaning, too, in the word as applied to military matters, traits which cannot much be trained into men, although they may perhaps be trained out, but thought, observation on the ground and discussion of tactical matters, practice in battle formations, will beyond a doubt train men and enable them to act more quickly, will cultivate inspiration or assist in helping out that of others. We can then discuss certain formations suitable for certain types of ground, and if satisfied lay up in our minds our own thought or that of others for future use. We can study formations suitable for bringing up supports and reserves over ground broken parallel or perpendicular to the enemy's general line, over ground inclined to the line of fire, defense and assault of positions on hills of different heights and different degrees of steepness of slope, of woods, farm houses or groups of buildings, villages, defiles, etc. While no two portions of ground are just alike, they will exhibit certain features and combinations, and the mind trained beforehand, natural capacity being equal, will have the advantage over the one that is not. While we cannot adopt rigid rules we can arrive at pretty correct general principles. We do not want fanciful theories or formations, but sound principles, and understanding these an officer who can see into the ground before him, will without a labored calculation on trajectories, angles of fall, etc., determine what to do quickly and give his orders accordingly. If subordinates are trained they will understand and carry out orders properly. Practice and discussion on the ground with and without troops will bring this tactical training if it can be taught. It cannot be obtained from books, although they may assist in the general result, especially with one who has some natural or cultivated eye for ground, and does some such out-of-door study even by himself.

Most of the minor operations of war can be carried on practically at our regimental posts, and time should be devoted to them. The writer is not sufficiently enthusiastic to wish to see all of his own or of others' time taken up week in and week out with these matters. If but little more than that now employed at posts were directed into the best channels and the work amplified by con-

centrating yearly the troops of different posts with the National Guard, results would be obtained of the highest value, but we want first to be able in all cases to teach the National Guard what is right.

Instruction of officers on ground without troops has, in some respects, advantages over work with troops, especially as our commands are so small. They should be taken out in a body and positions and formations freely discussed on a well-arranged plan. It could be done with deliberation and absence from restraint. Each officer would be placed on his mettle and made to think on tactical matters, and would obtain the benefit of the ideas of others. The troops could be subsequently used on the same ground to illustrate at least a portion of the discussion. Every one would then know what he is doing. When we have movements requiring umpires or resulting in a subsequent critique, the umpires should be sent out beforehand to study the ground thoroughly and a critique be given to the assembled officers on the spot. Elaborate criticisms made up and read out several days after are of little value. As an adjunct to the work in minor operations there should be at each post a topographical (contoured) map of the vicinity or the portions of it over which tactical work is to be done. By issuing copies to all officers and having it copied on a large board we could use it to some extent for work during the winter (or summer in the extreme south). Such a map could take in portions of ground off the reservation, if necessary, as tactical discussion can go on without troops. This map would be something of an undertaking, but there is probably sufficient topographical talent at most posts to produce it. It is referred to again under the subject of topographical work.

The question of handling riots is one in which the officers and men require tactical and other training. One of the important things in this connection is for officers, particularly, to be well acquainted with the cities near which they are stationed. Either by personal visits, or for lack of that, study of the maps. Here, perhaps, we can find some use for our practice in signalling, and certainly among both officers and men abundant opportunity for firmness and forbearance. Probably the most important thing for us to understand is the limitations of the military in its connection with the civil power. By understanding these thoroughly we can act confidently within them. Through ignorance the in-

discreet will make trouble by exceeding authority ; the over-cautious will fail of accomplishment by not acting up to the authority vested in him.

The instruction at posts should be such that when we can obtain a concentration of Regular troops or with the National Guard, time will not be wasted on matters of minor detail, so that we can utilize to the utmost the increased force for tactical work.

Officers should be encouraged to visit the battle-fields of our Civil War and those of Europe, and while actually so employed be given a status similar to a hunting leave, paying their own expenses, but not having the time count against the authorized leave.

Instruction to-day is aimed mostly at lieutenants, partially at captains, and none to speak of at field officers. The first two are being taught in theory at least most of the matters which, if taught practically, would go to make up the thoroughly useful officer. We have the general subjects of the functions of each of the three arms and of all combined well handled in various books, but the real, live subject of tactics we have to pick up here and there from books, from ideas put forth in our magazine articles, from observation and thought. We might drill alongside of an officer for a year and hardly know his views or how he would act. The field officers are our natural instructors in this subject. To-day if our army were mobilized and concentrated for action we could rely on each other in many ways. We would find mostly honorable gentlemen, devoted to their duty and to the cause ; we would find generally a uniform system of discipline, of court martial practice, of administration and keeping papers ; we would probably find considerable proficiency throughout in the performance of the duties of security and information, especially on the part of the officers who have knocked about on the frontier, or taken some interest in finding out about the country near their posts ; we would find entire uniformity in close-order drill. In fact, we would have a brave, well-behaved army, ready to fight and fight well if led into engagements with any sort of judgment as to tactical questions. Here we would fail, if the work most of us are accustomed to seeing in time of peace is an index as to what we would do in war, and no inspiration is going to come to bring a change. What would happen, and on this point I challenge contradiction, is that whether we should be contending on the north against the English regulars and fairly disciplined forces



of the Canada militia on ground much like that seen in our own country, or against the guerrilla warfare we would meet on the south amongst the sugar, coffee, or banana plantations, or dense undergrowth and forests of the tropics, we would mostly be led into action, according to the way it was done during the War of the Rebellion, according to the normal formations laid down in our drill-book, or be turned loose without reference to the nature of the ground or to cohesive action. Some would send their dressed lines of skirmishers through forests and sugar brakes, over rolling country, when one portion would be exposed to a galling fire while the other stood helpless out of sight and unable to fire. Some would turn the companies loose, and have them advance with reference to cover, and without reference to a combined action, supports would be sent forward without reference to cover, without reference to the best formations adapted to the ground. We would see our brave comrades and men falling around us instead of advancing to victory, find ourselves unsupported in advance of the rest, or in a hole where we could do nothing. All this we would see, and more of this than of good formations. If victory should be ours it would be due to the bravery of our officers and men, and not to skill in the use of proper tactical formations or methods of advance. This, as a rule, as there would be exceptions, but it is questionable whether the exceptions would find their ideas immediately understood. Anything not in the drill-book might be looked upon by many as a fancy theory. It is not a pleasant outlook and is not being remedied in the least by our examinations or increase in the matter of theoretical study. While a large number of thoughtful men appreciate all this, a large number are following the force of the example set. If it is possible to bring about a change in this matter it should be done. There is, perhaps, a remedy; it is to start a school for field officers. Let the proceeding be a wholly dignified one and not a school-boy affair at all. It could be carried out in this way: Issue an order creating a board of field officers to meet in or near the Chickamauga Park for the consideration of tactical questions. The board to consist of a certain number of cavalry, infantry and artillery field officers. Before the board meets a number of tracts of ground of different types with varied features, some with houses and villages, if practicable, should be selected and mapped, with care, and a number of tactical problems elaborated. Lay down for the board sound tactical principles from which they are

not to depart. Let them assemble from day to day and discuss the tactical formations to be taken by a battalion, regiment and brigade, acting alone and as portions of another force. Also where artillery and cavalry should be stationed, when and how they could act to the best advantage. Also affairs of outposts and advance guards, and the attack and defence of woods, houses, etc. There need 'be no instructors, but junior officers could be detailed as recorders to keep track of the decisions of the board, which should for each day be final. There should be no report required, beyond this daily record. In fact, the report to be a secondary matter, the main object being to inculcate in the field officers the sound tactical principles. The detail of each field officer not to be prolonged over two months, unless certain ones are detained to assist with the next board. The proceedings to be forwarded immediately, and perhaps after a critique by or under the direction of the Commanding General of the army, a copy of this, and the maps showing formations be sent to each field officer, who could then be required to submit his individual views. If such a proposition should terminate in a tactical board of a few officers to spend a number of years getting up a lot of wooden formations and rules to be used on various sorts of ground it would be most unfortunate. If the board is compelled to work on good principles, there will be sufficient uniformity obtained. Tactical questions are matters to be solved by judgment on the ground, on certain sound ideas, depending on the quality of the men, of the opponent, on the ballistic properties of the weapons, and the proportion of different arms engaged, and nothing more than the dissemination of sound general principles is aimed at. This plan would not be difficult of accomplishment. The maps could easily be made up and blue printed, and the other expense would also be slight, involving only the cost of mileage, a comfortable camp and mounts for the officers. All of it could probably be done without special appropriation. Those who would condemn such a course could find their only argument in a want of intelligence on the part of our field officers. This is not admissible. Such a system pursued each year, supplemented by an enforcement of many of the important but neglected provisions and some revision of our drill-book and proper instruction, would introduce some general uniformity in our tactical training, would give us, if thrown together, some idea as to what others would do, some feeling of confidence that each other's work would be

supported. We cannot get our whole army or even a considerable portion of it together to give this element of uniformity of training—our post graduate schools for juniors cannot accomplish it, as the graduates make little impress, however sound their knowledge. Moreover, they know no more, and often less, than many officers who have not attended. This field officers' board would meet the question as well as it could be met under our conditions. It might be the foundation of a splendid war college. Its success would be exactly in proportion to the interest and intelligence displayed by the field officers, and if a failure resulted it would be due to them, unless some ambitious pedagogue wanted to stand them up in a row for recitations or tried to enforce written examinations or other ill-devised methods. It would seem at least to be worth trying. The writer has advanced this idea to a number of officers, and has not been met with an argument against it.

The study of tactics should be carried on in the same general way for all arms, officers of each arm to have a special knowledge of the use of his own, but all to have a clear idea of the functions of the other two. No intelligent study of tactics can rest on any other basis. The artillery officer should be better informed as to where he can take his pieces, and the best positions, the cavalryman must know where and when to use a body of horse. For both a quick appreciation of ground is above all necessary. The training of infantry has been discussed more in the preceding pages than the other arms, because on an efficient system for it depends so much. Both the other arms require more training for officers and men, and the officer has more company work, and more study to perfect himself in his special branch. On knowledge of horses and material there is no general deficiency. Indeed, throughout the service each arm has a pretty thorough knowledge of its drill regulations and other matters, and the principal motive of these pages is an argument for more general and practical study of tactics, field engineering and topography, the latter two as a means largely for mastering the first.

As before remarked, the mere theoretical study of topography is meaningless. The course at West Point in descriptive geometry, descriptive and other drawing, and especially one plane projection, with what is taught in map making there, and with a practical knowledge of and readiness in handling the simpler instruments is, in my opinion, a better foundation for practical

instruction in the military topographer's art than any book I have seen on the subject. It becomes a question of some technical skill with the pencil, protractor, scales and other instruments, and principally a correct appreciation of slopes and conveying to paper by means of contours a representation of them. So far as other details are concerned, their representation is a simple matter compared to that of handling contours rapidly and with an approximate degree of accuracy. There are some men who cannot learn topography, occasionally because they cannot draw, but generally because incapable of obtaining a correct appreciation of ground. Any one with this faculty who can draw a little can learn topography under a proper system of instruction in making contours. Indeed, without this faculty, one may be a fine draughtsman, may be an expert with instruments, a fine land surveyor, a computer of the highest grade, and be incapable of doing rapid military topographical work. None of these qualifications are necessary for a military man. The faculty referred to is capable of cultivation, and in no way more than in this work. The method recommended is through the use of the transit and stadia. These to be employed as a *means only* in obtaining data to be used by those undergoing instruction. They need not be experts with the transit, in fact, have nothing to do with handling it. There is no doubt that working with a skilled topographer is the best means of obtaining proficiency, but this system can be carried out at any post provided there is a transit and one person who can use it. The stadia rods can be made and tested with no trouble by consulting Johnson's or Root's works. Before beginning work an officer should understand thoroughly the compass, clinometer, the range-finder he is to use, and platting angles. The West Point course or somewhere near its equivalent is presumed. Practice should be had in handling the stadia reduction tables, which should be copied on the back of the field drawing board for each ten minutes of arc up to  $10^{\circ}$ , each  $30'$  to  $15^{\circ}$ , and each degree to  $30^{\circ}$ . Deducing the difference of height between two objects involves only the multiplication of two numbers of three or four figures each. Each officer to have a drawing board about  $12'' \times 18''$ , a protractor and proper pencils. The best paper to use is that laid off in squares of one inch to assist in guiding the protractor. Some initial altitude is assumed, the transit is set up at a station and a large number of stadia readings taken all around the arc. The bearing, distance and vertical angle are



read, called off, and platted : from the latter two the difference of altitude is immediately calculated. Thus the altitude of a large number of points becomes known and contours can be drawn in correctly. The work should proceed slowly at first, and only about four courses taken, of about 800 feet each, closing on the first point. Then a closed line of six to eight miles to be run, and the work balanced horizontally and vertically. With this as a basis those under instruction should proceed with hand compass, clinometer, and perhaps range-finder and aneroid, and fill in the area mostly by pacing. Any one who could ever learn topography would by this means be able to produce a fair sort of a contour map. He would see his results before him and know what they mean, ascertain his own faults and be able to correct them. His eye becomes trained ; he would then be able to begin work with the cavalry sketching case. If one or two only of those present had some practical skill, so much the better, but this course would be adapted to any graduate (or one possessing a fair equivalent) who has the least natural facility. After this a number of days' practice with the sketching case, proceeding slowly at first and increasing to ten or fifteen miles in a day. Rapid use of the sketching case is the highest development of the topographer's art with instruments. To ride rapidly over a piece of ground and be able by quick observation and mental estimation of distances and slopes to make a fair sort of map, or to use a map and have it convey immediately a clear idea of the ground, is the highest development of the art, and the one perhaps more would use. Fifteen days of such field work shortly after graduation would, if added to occasionally from time to time, bring out the talent there is in the army in this direction. Topographical work could at all of our posts be turned to some use and officers be given independent work by filling in the maps of the country. The geological survey maps on a scale of one-half inch to one mile, or in their absence, the county maps could be used as a basis, and detachments sent out each year on bicycles or horseback could fill in blocks of country and report on its military features. In a few years a large amount of valuable data would result.

Of more *immediate* value would be the construction of good contour maps in the vicinity of our posts for work in connection with minor operations as referred to previously. The simplest way to make this is to run in all the roads with transit and stadia

and perhaps additional lines, balance up the work and fill in with the simpler instruments. This should be used as a means of giving an opportunity for practical work to as many officers as could be spared—from the line of file-closers for example, and the whole undertaking not placed on the shoulders of one man who probably needs no more practice. In this matter of practical topographical work there is no necessity for more than a short period each year being devoted to it. Moreover it should not be turned over to a few experts just to pile up handsome results. It would do no harm, however, to any officer in our service to put in one full season on such work undertaken seriously and not as a mere pastime, but always to draw on the same few men is wrong. Perhaps the cavalry officers will be called upon more than the other two arms to turn in maps and make reconnaissances, but all officers alike should have about the same training. Photography is of use as an adjunct to topographical work, but only as an adjunct. Of more value to officers is the ability to make a hasty landscape sketch showing by a few lines the most essential military features. On such sketches can be entered bearings, vertical angles and ranges, with references on the map and sketch. A photograph does not usually bring out as many essential features as a good sketch, as every one who has made the latter knows that there are constant changes of light and shade which show the lines of ridges and depressions, the ground developing as the sketch progresses; by using a field-glass many important features can be entered on a sketch which a photograph could not possibly show. It requires a strong memory and considerable practice to be able to identify objects on sketches, and put them together for the production of a map. The employment of photography in this way requires the most refined skill and personal inspection of the country, and in military work the great danger lies in accumulating a large number of photographs from which only meagre map results can be obtained, and then only through a tremendous amount of office work. Making the sketches is in itself a valuable training for observing ground, while making photographs is not. Photography is a valuable auxilliary, especially for balloon work, but we can always find expert photographers to do such auxilliary work, and the body of officers do not need the training. It can do no harm, unless it is the means of crowding out more important things, and unless the inexperienced through a knowledge of the theory, which is

most attractive, believe they can make good maps by employing it as a principal in place of only an auxilliary means. There is not space here to discuss in full the merits of photography and pencil sketches. The writer hopes that really valuable instruction in topographical work will not be crowded out by that in photography.

The practical course in military field engineering is to a considerable extent, as referred to above, a matter of company duty, of instruction of men. Outside of this is the selection of trace for all kinds of the simpler constructions, described in the elementary works, calculating dimensions, time, material, number of men and tools required, problems of defilade, etc. While not in favor of taking up a large amount of time of the men on useless fatigue, it would be useful to have a small redoubt, well placed and planned, at every post, so as to bring in the various shelters, traverses, bomb proofs, revetments, a magazine, and gradually build it up, thus using it as a means of instruction for a short period each year until it is completed. It could be further used as an object for attack and defense. There could be at each post pieces of timber of proper sizes cut for use in throwing simple spar and trestle bridges. They could be used time after time. A few hours a day for a week twice each year to each company in these simple details of field engineering would be of the greatest benefit. The instruction in this subject may vary somewhat for the different arms to meet their requirements and what they would be most likely to have the most of to do. The cavalry officer will have less than the infantry in the superintendence of construction of field works and more in the matter of hasty demolitions, and the artillery more in the selection of emplacements for their guns, more knowledge perhaps required of the works of a semi-permanent nature, and of siege works. However, as the infantry soldier will have a large proportion of the actual construction of all sorts of field works, of temporary bridges, the infantry officer should be as familiar with the elements of engineering as the artillery. The foot artillery has in addition, mechanical manœuvres which really come under this head, and with which the other arms are little concerned.

In the matter of enforcing theoretical instruction the system of recitations has become fastened on the army. There seems little to be said in its favor. Instead of sending officers to recite the same could be accomplished by requiring a written examina-

tion at the end of the time fixed for recitations in the subject, as set forth further on. To-day an officer may equip himself thoroughly in these matters, beyond the scope of the texts and still be required to recite. Moreover it is better to study a subject thoroughly and not by piecemeal, as in connection with the weekly recitations. Recitations are not suitable for grown-up men; those who need them can well be ignored. They are of little value to them, and are an unnecessary annoyance to others.

Because of our range of climate, and the liability of troops being called out for the performance of various duties, it is not possible to draw up a scheme for the division of time throughout our army, in which instruction in various subjects shall take place. This question of division of time should be left to department commanders, primarily and secondarily to post commanders. It would seem best, however, to prescribe from the headquarters of the army, the scope, general rules as to methods and, above all, what results are to be expected in practical work. There will necessarily be differences at each post, but officers going from one department to another should be able to carry with them their record on work so as not to be subjected to continued instruction in some of these matters after they have fully developed their efficiency.

The following course is merely a suggestion for officers after entering the service and to show what can be accomplished in two to three years. It must be borne in mind that the officer has usually studied a large portion of the subjects set forth. This work would continue with the regular post and company duties, excepting in the cases mentioned. The examination referred to is, unless otherwise specified, to be written and to take place near the end of the month in which made.

October.—Examination guard manual, and equipments of the soldier, and of the horse or horse and piece, according to arm.

November.—Practical examinations in drill regulations of arm, including school of the company, troop or battery, elements of fire discipline, gymnastics, clearing obstacles, jumping ditches.

December.—Quarterly papers of company, including one muster roll and return of quartermaster's property as formerly made. Muster roll to be made up from retained copy with the new data furnished. Examination, oral.



January.—Security and information ; examination.

February.—Elements of field engineering ; examination.

March.—Firing regulations ; examination. Also practical instruction in handling simple topographical instruments.

April.—Two weeks' course in topography, described above in connection with transit and stadia. No examination ; excused from all other duties during course.

May.—A course in the elementary principles of the effects of fire of officers' own arm ; examination. During the last two months gallery practice has been in progress.

June.—Target practice.

July.—Finish target practice and practical work in signalling, in case it is retained.

August.—Military engineering. Field work ; selection of trace of intrenchments, problems of defilade, calculating dimensions, time, etc., for the construction of certain earthworks. In general practical work without troops. During the year it is presumed that practical work with troops has been going on in matters affecting their instruction, which includes work in field engineering.

September.—In the field.

October.—Three days' work in connection with transit and stadia for practice in contours and seven or eight days' work with the sketching case, gradually lengthening the distance.

November.—Post and regimental papers ; examination.

December.—Drill regulations ; for each arm that now laid down for examination of 1st lieutenants for promotion, and ceremonies. Examination.

January.—Lectures on cooking and handling the ration, or study of authorized texts and castrametation. Examination.

February.—A course on the effects of fire—of the rifle as well as of shrapnel, rapid fire and Gatling guns. Examination.

March.—Convoys and characteristics of the three arms. Examination.

April.—A theoretical and practical examination in topography, using ground not previously worked over by officer.

May.—A practical examination in field engineering.

June-July.—Target practice.

August.—Some practical work in signalling. All signalling work to be in connection with company.

September.—After returning from camp require an essay of some

definite length to be written in three hours on the subject of camping.

In October about a week's work with sketching case.

November.—Practical examination on the ground, well mapped, of the effects of fire, especially of one's own arm.

December.—Examination in Military Law. This has been delayed until now as officers are usually pretty well equipped in this direction on entering and have considerable practice on courts.

Cavalry and artillery officers should have, in addition, special further examination on the care and use of material pertaining to their special arms.

During this course the officer would, of course, be obtaining practical instruction through the regular drills according to his arm, in close order, extended order, mounted and dismounted, or in the handling of the piece, etc. ; in advance guard and outpost work, patrolling, field engineering, target practice, gymnastics, clearing obstacles, jumping ditches, in fact, in all the matters in which our Regular companies can be made proficient with the large leaven of old (and who should be instructed) soldiers.

After completion of the foregoing course there could be during the following two years an examination in Organization and Tactics or the larger portion thereof ; also in Army Regulations and in the Relations of the Military to the Civil power, and before the end of the four years, in International and Constitutional Law. The greater part of this course would be review for graduates of the Academy, with the addition of the practical work. It would enforce the fact that these are the important details for an officer to remember.

The examinations should be rigid and be marked closely, not on following the language of the texts, but on accurate and clear knowledge, and the officer freed from further examinations according to his standing, for a number of years. If he makes over 95 per cent., free him for six years, over 90, five years, over 85, four years, over 80, three years, over 75, two years, and over 70, one year. The foregoing figures are suggested only ; they could be satisfactorily fixed by consulting the marks given on examination since January 1, 1893. It may be that in some portions of practical work officers cannot attain proficiency. The only way to do in such cases is to give them a second examination, and let them alone on that subject. It may be something not wholly

essential but desirable, map making for example. These matters can be settled only by the examinations for promotion in our army and thorough knowledge on other subjects will compensate for deficiency in one or two. Once well obtained these subjects are not lost, and the examination is practically no burden every six years. The object in introducing recitations in the subjects now laid down was probably so that we would keep in touch with these details of our profession, and the examinations are offered as a substitute for them, the writer believing that the object is, on the whole, a good one. If one twice makes 90 per cent. in guard manual, signalling and topography he could be freed from them. In drill regulations, field engineering, tactics, fire effects, regulations, and law, and hippology, and special examination for artillery, the examinations may well be kept up until an officer attains his captaincy, and after that time when they could be entirely practical excepting in law and regulations. After forty all examinations to cease excepting for promotion to captain and major. While men do not stop learning after forty, if they have not mastered these practical details of the profession before that they never will; that is, when opportunity has been given.

After the first two years' course, the work in winter could then consist of essays, lectures by those well qualified to give them, discussion of campaigns, of tactical questions, of practical matters of value to the service, of problems on the map of the vicinity, kriegspiel. Each spring and fall a lieutenant to be required to do at least a week's topographical work, unless expert, and more when he can be spared. Each year to be required to turn in at least one problem in field fortifications solved on the ground according to given conditions; at least once a month when weather permits officers to go out without troops and solve and discuss tactical questions on the ground and once each year turn in a solved tactical problem. This in addition to the work with troops, or if an officer is doing special duty at a post as adjutant, quartermaster or other duty, all but the tactical and engineering problem and tactical work without troops could be omitted. On this subject every line officer should be kept thinking. As is, I believe, generally the practice now, all officers should when they can be spared from their work attend the reading of essays.

It is more difficult to recommend a course for the lieutenants now in service. Without radical change it could be as now laid

down; so many subjects each winter with an examination on them in place of recitations. In summer the practical work in topography, engineering, etc. Perhaps many of the older lieutenants would not take kindly to the two weeks work in the former, feeling that it would do them little good. It could be made voluntary for all over thirty-five years of age. The introduction of a practical examination for promotion would be an incentive if it were required. Of course in tactics all in every grade would take part.

It is to be observed that in order to carry out this system little remains to be done excepting to make the course practical as regards topography, field engineering, security and information and other tactical work, enforce more rigidly the training of our men in fire discipline, and of both officers and men in looking out for themselves in the field, especially at our large eastern posts; to do away with the system of recitations, substituting therefor examinations; and to allow an officer to become proficient in these various details for six years.

It is a question whether these examinations can take the place of those for promotion by a central board. It would probably be advisable to keep up the latter for at least a few years. The examinations by these boards should be thoroughly practical in addition to the present theoretical ones, which are on a fair basis and well adapted to the testing of theoretical knowledge. When this more thorough examination was adopted officers were given fifteen months notification and the question of fairness in introducing practical work could be treated in the same way, and herein lies the power in Washington to enforce such work at posts. The boards are now authorized to introduce such work as they see fit, but it does not often extend beyond that laid down specifically, and probably in fairness should not, on account of the lack of opportunity officers have had. It would seem best to lay down pretty fully the scope of this work for examinations, and issue orders so that it would be carried out at posts with some uniformity, and it might be well, too, to prescribe or at least recommend certain sound methods. It would be impossible to carry out the practical examinations unless officers were detailed on the board known to be thoroughly familiar practically with the subjects, and it would seem best to detail officers specifically to examine into a certain subject or subjects, the whole board having power of revision, as now.



The following changes only in a few particulars the scope of the present theoretical examinations :

For promotion from 2d to 1st lieutenant.

Manual of Guard Duty. Written examination.

Military Law. Written examination. This now includes only Military Law proper. To include further "Instruction for the Government of the Armies of the United States in the field"; the "Law of War" and "Civil functions and relations of the Military," as now provided for captains. It is certain that in time of war all regular officers should be prepared on the first two omitted subjects; and in case of civil disorders they should understand thoroughly the last; it is much less than the course in law at the Academy.

Drill Regulations. Written and practical as now. The only addition desirable under this head is the introduction of more practical demonstration of a knowledge of fire discipline and instruction on varied ground. There should be throughout the army entire uniformity in the instruction in fire discipline, so far as essential principles and methods are concerned. It is really the drill of the company in extended order. This subject has become somewhat mixed in the service and is now scattered through three different books, the Drill book, Infantry Fire and Firing Regulations.

Art of War. Security and Information and Organization and Tactics. Written as now. In the first a practical examination through the solution of problems on maps.

Army Regulations. Written. To include much laid down in Troops in Campaign, administration and other essentials.

Effects of Fire. Written and practical problems on contour maps. The effects of the different kinds of fire, could, it seems to the writer, be treated in one book. Fire discipline is essentially a portion of drill, and much else in our present work on Infantry Fire comes entirely in the domain of tactics. The subject should not be treated too discursively and be for general use of all arms within the covers of a book about one-third to one-half the size of the present work on Infantry Fire.

Field Engineering. Written and practical, its scope being to demonstrate practical knowledge of how to make various revetting material and put them in place, selection on the ground of trace for hasty intrenchments for a field-work with computation of dimensions, strength of working parties, quantity of material

for revetment, probable time of construction ; problems of defilade, location of traverses, shelters, etc. ; construction of simple spar and trestle bridges ; making piers of casks, etc. In fact the same scope as now only practical. Some of this work could be done on maps but it would be better on the field.

Topography and reconnoissance. Written and practical. To make a road sketch of ten to fifteen miles in length, with a regular reconnoissance report, to be turned in before a given time at night. The examining officer should himself carefully prepare this work in advance to furnish himself a standard of comparison for that turned in. And it would be fairer to those examined to prepare this standard map with transit and stadia, not expecting of course at all the same degree of accuracy from the results of the sketching board. The examination should further extend to reading maps and oral explanations of the simpler instruments, construction of scales of pacing, gait of horse, scales of horizontal equivalents, etc. It is to be noted here that while the method of instruction recommended involves somewhat accurate contour work in connection with transit and stadia, the examination does not. It will be recalled that those instruments and the more accurate contouring resulting are used as a means of training only.

Signalling. Practical only.

For cavalry and artillery officers the special examinations as now laid down, and as practical as they can be made. For promotion from 1st lieutenant to captain, the same as above excepting as follows :

Omit Guard Manual as now. Also Signalling.

Topography. Entirely practical, if previous examination has been had, map reading and require officers to ride around a certain area of ground and make some sort of a map of it without instruments.

Field engineering, if previously had, entirely practical, having to do principally with the selection of trace and location of works.

The examination in the Art of War to be thorough and practical, solving on the ground problems in attack and defense of localities, giving formations suitable for accomplishing certain purposes. In fact a thorough examination in tactics and minor operations. Officers coming up for this examination are approaching forty and if they can ever understand this question it will, under a proper system, be at this age.

In law the same, with the addition of International and Constitutional law. These are not studied at the Academy for mental training as is much of the course in mathematics, but to be remembered. If one needs this knowledge at 25 he equally does at 40.

A written examination in the Principles of Strategy and Logistics.

In fact, this examination for promotion to a captaincy is the most important. It is taken at about the age of forty, and it would not be a bad plan to order up all officers for the mental part by or before this age. In our army, so small compared to our population, men at forty should be examined to see whether or not they are accomplished soldiers, and it is the best time to determine it. After this it would be safe to omit all mental examinations, excepting those in drill regulations and tactics. These change, and officers often after forty will not change their ideas accordingly.

It may be said that our service schools are the places to learn these details and accomplishments of the profession. It may be true so far as the artillery school at Fort Monroe is concerned, but the school at Fort Leavenworth cannot receive all infantry and cavalry officers. The question of the detail is largely a voluntary one, and many officers who would like to learn do not care to be subjected to school-boy methods. There is a great lack of mental homogeneousness in the material sent from regiments. Brainy men are given the same course as the mediocre and indifferent. There is so much good to be said of the school, and criticism is so much easier than creation, is so cheap and often so aimless that I criticise anything about the school with hesitation. But there is too much committing to memory of the language of the texts allowed if not actively encouraged. In fact, officers are given a better mark on examination for following the exact language. If one understands anything he does not need to resort to the words of another to explain it. The practice referred to often gives a mere booker the advantage over his intellectual superior, who has to spend his time committing exact language. It tends to keep the best men away. There should be some way of grading men without resorting to this means. I do not know that this is true of all the departments. While there is much practical work required of student officers there is not really much actual practical instruction, and too much recitation

from books. A large proportion of the practical work done there could be accomplished at posts. A large number of men who would not seek the detail at Fort Leavenworth would take up the text-books as earnestly as they do now for examination for promotion. If these examinations should be made more practical the incentive would exist to acquire the knowledge on the same basis. Indeed I am not sure that the majority need this incentive. Considering the fact that so much in the school is taught directly from text-books, and that mostly on this basis men are turned out for field work, it would seem that in view of the substantial foundation laid at West Point, officers could with some intelligent direction obtain somewhat the same results at their posts. In some cases better and in some worse. Some men will not or cannot learn even at a school and others will learn wherever they are with facilities and encouragement.

We could then have a War College where candidates would be required to pass an examination in most matter obtainable at posts, before being given the benefits of the course, which should be mostly by lecture, discussion and out-of-door work, largely without troops, in tactics, minor operations and some engineering. Also logistics and strategy, and perhaps some in international law. It should be a place to be sought by brainy men of all arms for the sake of coming in contact with others of like stamp, for the sake of the library, of other facilities and some direction of their efforts—not where they should be required to waste their time in memorizing the words of some one else, not where they will be subjected to school-boy methods of any kind. It is entirely feasible to bring about such a college within a few years. There is sufficient education, talent and ambition among our officers to make it a success. But such a school can never be founded on a system of recitations or memorizing. It will drive out the best element as a rule, or annoy it to death if it enters.

We now have the special courses at Willet's Point and at the arsenals, and they are of value. There is also the Cavalry and Light Artillery School at Fort Riley. It is difficult to see why any post cannot be a school as much as this. The method pursued the first few years at the Fort Leavenworth school was most valuable, viz.: assigning officers in turn to organizations of the three arms, cavalry, the light battery and infantry. A school based on this idea alone, to give lieutenants experience with the other arms for a year, no officers but the captains and field offi-



cers being permanently assigned, would be of great service. Lieutenants to be ordered there only after completing the practical course at their posts.

The question of instruction in colleges is one so intimately connected with the training of our officers that it seems necessary to consider its general aspect. It seems to the writer that the military course at our colleges should be as practical as it can be made, and deal hardly at all with text-books except at the purely military schools. Even at these the time of the boys is taken up largely with other educational matters. Of course there are a number of these schools where the course is based on that of West Point and is founded on much educational experience. The writer does not pretend to refer to these, but to the ordinary college detail, where comparatively little time is given. It may be said, however, that of all the military schools West Point can perhaps afford to be more theoretical and less practical than the others, as its graduates all go into the army, where there is abundant time for practical training, and where there should be abundant opportunity. Men going into civil life will carry with them comparatively little of the contents of text-books, of theories of the art of war, but simple military matters practically performed or illustrated become fixed in the mind. The course must depend upon the time the faculty allows, but the following is suggested as the subjects which should be taken up in order of their importance, omitting the remaining in case there is not time. 1. Time equally divided between close and extended order, the latter to be used mostly in inculcating so that they can never be lost during the coming years of civil pursuits the few and all important principles of fire discipline. 2. Company papers, guard duty, and castrametation. 3. A little target practice, if practicable. Some gallery practice could always be held if time permitted. 4. The subjects of advance guard, rear guard, outposts and patrol work; if time is limited, by lectures and practice on the ground, requiring with older student notes on the lectures and worked performed. Time allowed in winter could be employed by suitable black-board lectures, on map of country if it existed or could be made. 5. Practical work in making revetting material, hasty entrenchments, simple bridges, and crossing of streams, and camping expedients. 6. Characteristics of the three arms. 7. Lectures on tactical formations and manœuvres for older students. It would seem that these should be

always on the ground ; if there is opportunity to make the maps and furnish each student with a copy it would serve to make a more permanent impress on their minds. The following is merely suggested as the scope for three lectures. In each instance they would depend on the locality and judgment of the instructor. 1. Selection of trace for hasty entrenchments. These to be previously marked out by stakes on the ground, or by strips of red cloth on hedges, walls, etc. The lecture then to give the reasons why this trace is selected, how it should be defended and how attacked ; its probable relation with other parts of the field. Discussion and questions invited. All this should be as simple and untechnical as possible. 2. Preparation of a wood, village or group of farm buildings for defense, showing disposition of firing line, supports and reserves, the probable progress of attack and defense, under certain assumed conditions. 3. If near a large city a lecture could be given on the handling of mobs, the defense or guarding of railway stations or other buildings, keeping open lines of track, etc. Here it would often be difficult to give the entire lecture on the ground on account of the crowds, but it could be done on a map and with photographs or sketches after requiring the class to examine the ground.

Besides the above the following subjects could be taught to those taking various special courses in civil departments of the school. Military topography and reconnoissance to civil engineers, also a lecture or two on military engineering, and to these and to electrical and mechanical engineers lectures on the use of explosives, destruction and repair of bridges and railroads. Signalling for those taking practical course in telegraphy, and to those who wish to take the course. The matters under the first five headings are those which if taught pretty well, would remain with men for many years. None require high technical knowledge—nothing but practical training, a relief generally to the students from their books. The students could be supplied with some text-books for future reference, and copies of lectures with maps of the ground on which conducted.

Certain legislative changes to increase the efficiency of the service have been fully discussed within the past few years. The principal ones proposed are reorganizations of the artillery and infantry, and the consolidation of the staff departments. Important as they may be these questions do not intimately affect the instruction of line officers. It might simplify matters of training

to have all our recruits come in at a certain time of the year, but this does not seem at all a feasible matter to accomplish. The writer has heard a number of officers of high standing express themselves in favor of graduating all from West Point into the army instead of into a particular arm, the engineers corps to obtain its officers as does the Ordnance Corps now, and lieutenants to be assigned in turn to the various arms, and finally at a certain age or on attaining a certain grade, as that of captain, to take permanent place in the army. This would have two great advantages, obtaining finally officers better suited to the arm, and giving all abundant opportunity to become familiar with the three arms. The question is admissible of many arguments *pro* and *con*. The subject is worthy of extended discussion for which there is not space here.

The subject of the maintenance of a general staff in our small army is referred to above. This, too, is a subject worthy of more extended treatment. Perhaps the best way is to extend the training of the *seemingly* most capable officers in an advanced War College. Even in the large armies of the world the element of chance enters largely in finding the men most fitted for high commands. It is peculiarly so with us. It would have been perhaps highly disastrous to have had the rise of Grant, Sherman and Sheridan regulated by a general staff, and conditions affecting this are but little changed now from those existing then. As high training for as many officers as possible to aid those who develop genius without the power to smother it, would seem the system best adapted for us.

No man, no body of men, no community, can stand still. It improves or retrogrades. There is little fear of the latter in our army; there is vigor and intelligence enough, and all they need is to be directed somewhat into proper channels—into practical work, enough to cultivate desirable faculties without attempting to press all into the same mould.

The army is and should be looked upon as a training school, but too much should not be attempted by a system, especially where as with our army its exact employment in time of war cannot be foreseen. It is to be expected that most officers will in some directions go beyond the requirements of any scheme adopted. Many of these may through lack of natural talent be somewhat weak in portions of that prescribed, and make up for it in other directions. The writer has attempted to draw up a

system which will cultivate generally in our officers what seem to him the qualifications most necessary for American officers under existing conditions, and does not mean to infer that what it prescribes is all an officer should know. While criticising many existing methods, it is through no lack of respect for the ability and high character existing in all grades, but through a desire to see those attributes made the most of, to see the army under new conditions of increased population, wealth and culture be as worthy of the respect and admiration of our people as it always has shown itself in the emergencies of the past. No change in our system of instruction will create great commanders, but it can give a larger body of highly useful men, of practical, ready men, equipped in peace to train the youth of our country, and in war to throw whatever powers they may have into the mighty task of helping to organize, train, discipline, take care of and lead the raw but brave forces to compose our armies. This is the true mission of our officers. May narrow formulas never make it to be anything else.



## THE PRESENT STATUS OF FIELD ARTILLERY.

BY FIRST LIEUT. H. C. CARBAUGH, 5TH U. S. ARTILLERY.

**B**Y field artillery is meant, in this paper, the guns with their complement of artillerymen organized and equipped to manœuvre, and to act in concert with other troops in the field.

Field artillery does not include siege and position guns solely intended for use in attacking or in defending positions thoroughly fortified beforehand, but it may now be fairly said to include mountain artillery, horse artillery, ordinary light and heavy field artillery and organized mobile batteries of field howitzers and field mortars for high angle fire.

This extension of meaning of the term field artillery seems to be justified by changes and additions, hereinafter mentioned, which nations with tactically organized armies have made, or contemplate making, in adopting a diversified and special field armament intended to solve the varied problems which field artillery now meets and to overcome the difficulties presented by a modern battle-field.

### MOUNTAIN ARTILLERY.

On principle it may be said that a mountain gun should not be made of more than two parts, and that neither part should weigh over 200 lbs. so as not to exceed in connection with the carrying saddle and harness the transporting power of a mule, which is limited to about 325 or 350 lbs. Lightness is therefore essential while the greatest power possible is sought.

The accompanying table (I) gives details of the guns, the ammunition and the carriages now used for mountain artillery by the nations mentioned. Examining this table it will be noticed that the present models of guns have been in use for quite a long time. The most probable change will be in the English model, as that nation is not quite satisfied with muzzle loading, and furthermore an English firm has manufactured a more powerful B. L. mountain gun weighing 416 lbs.—the breech portion weighs 209 lbs. and the muzzle portion, including the trunnion ring, 207 lbs.

TABLE I. MOUNTAIN ARTILLERY.

Name of gun.	Austria 1875	England 1879	France 1878	Italy	Russia 1883	Spain 1874	Switzerland 1877	United States	
								B. L., 12 pr.	Hotchkiss
Material.	B. L., 7 cm.	M. L., 2" 5	B. L., 8 cm.	B. L., 7 cm.	B. L., 2" 5	B. L., 8 cm.	B. L. 75 mm	Steel	Steel
Weight in pounds.	Steel bronze	Steel, in two parts	Steel	Compressed bronze	Steel	Steel	203	218	121
Calibre, inches.	2.6	2.5	3.15	2.9	2.5	3.08	2.55	2.99	1.65
Lengths { total, inches.	39 36	70.45	47.28	39.37	39.76	37	37.91	45.6	46
Lengths { bore, "	32.88	66.5	41.7	35	.....	33	.....	39	34.4
Twist, in calibres.	30	8 to 30	30	41 7	40 1 to 20	33 2	.....	35.85	29 83
Number of grooves.	18	8	24	12	20	12	.....	24	.....
Breech mechanism.	Prismatic wedge	Muzzle loader	De Bange	Krupp	Cylindrical bis. wedge	Plascencia, inter. screw	Wedge, Broadwell	Sliding wedge	Sliding
Means of rotating projectile.	Copper rings	Gas check	Copperdriv- ing ring	Copperdriv- ing ring	Copper bands	Lead coating	ring	Rotating band	band
Vent.	Vertical	Radial	Axial	Vertical	Axial	Axial	.....	Diag'l then Axial	Diagonal Axial
Service charge gunpowder, pounds.	0.77	1.625 (Ring)	0.881	0.625	0.423 0.846	0.875	0.88	0.7 I. K. 0.9 Dupont	0.34
Common shell { weight, " bursting charge, oz.	6.34	7.625	13.875	9.375	8.8	8.25	9.48	12	1.9
Shrapnel { weight, pounds, " bursting charge, oz.	3.34	4	1.5	4.9	4.374	7	3.52	6.3	w hfusefull
Number bullets.	7.02	7.8125	14.3	9.7	8.9	10.01	10.14	12	Canister
	1.31	0.5	2.8	0.010	0.736	0.002	1.94	1.75	2.8
Muzzle velocity, f. s.	65	100 + 21 fragments	120 + 42 segments	105	100	90	112	160. Can has 125 bul.	30
Shrapnel effective { Range, yards. " elevation.	978.7	1440(Max.)	840	840	893	918	892	870	1298
	2083	4300	4050	2850	902	2075	.....	3680	4000
	7° 58'	.....	27° 54'	.....	28° 21'	.....	.....	20° (Max.)	14° 35'
Gun carriage, { without wheels. " weight, { complete with gun.	150	324	322	198	325	240	205	1205	*220
Number of rounds per { gun. " battery.	440	939	661	551	683 horse	584	573	550	453
" animals per battery.	32	96	70	24	96	100	20	32 in limber	78
" guns " "	448	864	840	444	1536	600	600	*Req. Animals: 1, gun and	.....
" personnel per battery.	67	220	94	148	206	81	83	wheel: 1, car, pole, six	.....
	4	6	6	6	8	6	6	rounds; 1, ammunition.	.....
	111	287	160	286	306	197	170	†In transportation by pack	.....
			(150 Alg'rs)		206			animals, 1 gun mule, 1	.....
			(240 Alg'rs)		306			carriage mule, 1 accessory	.....
					286			mule, and the necessary	.....
								amm. mules are required.	.....

TABLE II. HORSE ARTILLERY.

Description	Austria-Hungary	England	France	Germany	Russia	Spain	Italy	United States
	Horse artillery 8 cm., 1875	Horse artillery 12 pdr. (6 cwt.)	Horse artillery 8 cm.	Light field C/73/88	Horse artillery	Horse artillery 8 cm.	Field & horse artillery, 7 cm.	Light field 3.2 B. L. R.
Gun	Steel bronze	Steel	Steel	Steel	Steel	Steel	Compressed bronze	Steel.
	657.5	672	936.00	926.00	805.00	628.00	699.00	795.00
	2.95	3.00	3.15	3.46	3.425	3.09	2.90	3.2
	76.77	66.75	89.76	82.68	66.93	87.21	71.10	87
	70.56	59.00	82.20	73.44	57.67	Interrupted screw, steel ring	62.56	Interrupted screw
Gun carriage	Prismatic wedge	Interrupted screw and pad obturator	De Bange	Cylindro prismatic wedge	Cylindro prismatic wedge	Interrupted screw, steel ring	Krupp	Interrupted screw
	1102	1256	1102	1113	992	628	809	1197 with equipment
	54 60.2	60 62	56.3 56.3	55.1 60.2	54.9 61.1	52 54.1	49.6 53.8	57.75
Weight of in pounds	1103	1221	926	1080	1152	1426	1058	1031
	1764	1	1411	1973	1792	2050	1687	1768
	3582	4005	3516	4078	.....	3397	3394	3760 *
	1213	1170	1400	1235	926	1500	1160	2349
	4624	3900	3990	4387	3542	4186	3567	4499
Service charge, lbs. (powder)	2.1	Cordite, 12 $\frac{1}{2}$ ounces	3.31	3.3 (1.41 smokeless)	3.08	3.4	1.9 1.14	3.50 spher. hex.
Muzzle velocity, f. s.	1386	1550	1608	1450 shell 1375 shrapnel	1351.7	1509	1416	1685
Shell, common, lbs. (full)	9.51	.....	None	15.5	15.23	13.89	9.56	13.5 +
Bursting charge, oz.	4.5	.....	None	7.76	7.2	10.58	4.9	7
Shrapnel, lbs. (full)	10.51	12.5	13.5	17.78	15.59	.....	9.4	13.5
Bursting charge, oz.	1.7	1.5	2.1	0.793	2.2	.....	0.46	2.75
Number of bullets	105	156	120 bullets + 40 segments	262	165	.....	105	201 fragments and bullets

\* With equipment and 13.5 shell.

† With new 16.5 lb. shrapnel I. V. is now 1450, and 240 fragments and bullets.

TABLE II. HORSE ARTILLERY.—Continued.

	Austria-Hungary	England	France	Germany	Russia	Spain	Italy	United States
Description.....	Horse artillery 8 cm., 1875	Horse artillery 12 pdr. (6 cwt.)	Horse artillery 8 cm.	Light field C/73/88	Horse artillery	Horse artillery 8 cm.	Field & horse artillery, 7 cm.	Light field 3.2 B. L. R.
Number { of rounds on wagon..... Per battery..... Number of wagons.....	40 112 912 6	38 72 660 6	30 90 990 9	32 82 848 8	23 55 798 12	36 72 648 6	44 104 888 6	42 126 1080 to 1386 .....
Number { of horses { per gun..... “ wagon ..... “ battery.....	6 6 215	6 6 183	6 6 214	6 6 230	6 6 242	6 6 .....	6 6 175	6 6 144 149
Number { per battery { personnel..... guns..... wheeled carriages.	183 6 19	182 6 16	187 to 189 6 18	168 6 20	210 6 30	..... 6 .....	154 6 17	180 6 17
Effective range, shrapnel, yds. “ elevation..... Rifling, twist in, calibres..... Number of grooves in gun....	3750 10°. 37 45 24	4000 (Max.) ..... 1120 to 228 18	6340 (Max.) 17°. 29 26 24	3770 10°. 1 36 24	3830 ..... 370 to 380 24	..... ..... ..... .....	3380 14°. 6 46.7 12	4500 11°. 5 30 24
Means of rotating projectile.....	.....	Copper driving band Axial, with T-head	Copper driving ring Axial.	Two copper rings Oblique through wedge	Copper bands Oblique through wedge	.....	Copper driving ring Vertical	Copper band Axial
Kind of vent.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—In Austria the 9 cm. gun will probably be used for horse artillery, weight about 901 lbs. This gun is almost identical with the 9 cm. field-gun, though shorter. The English gun and limber loader probably weighs 3883 lbs.

There is doubt as to the weights given for the carriage and limber of the Spanish gun, the new 8 cm. steel field-gun will be used for horse artillery. The Italian gun with lighter limber is used as a light field-gun.

The shrapnel of the French gun cannot be effective at 6340 yds., for the shrapnel of the U. S. 3½ gun has a remaining velocity of only 690 ft. at 4500 yds., a better result than the French gun can give.



TABLE III. FIELD ARTILLERY.

Description.	Austria-Hungary	England	France	Germany		Russia		Spain		Italy	United States
	Field Art. 9 cm., 1875	15 pr. B.L. 7 cwt.	Field 9 cm.	Heavy field, c. 73	Nickel steel C/73/91	Light field	New light field, 1892	Field 8 cm.	Heavy field 9 cm.		
Gun { material { weight, pounds. calibre, inches. length, total in. length, bore, in. breech mech. }	Steel bronze 1072	Steel 784	Steel 1168	Steel 992	970	Steel 1003	Steel 968	Steel 963	Steel 1064	Comps'd bronze 1037	Steel 1181
	3.42	3	3.54	3.46	3.46	3.425	3.425	3.09	3.29	3.4	3.6
	81.10	92.35	89.76	82.68	82.68	82.7	81.828	75.46	81.10	82.6	93.48
	74	84	81.25	73.44	73.44	73.42	60.188	72.99	74.01	73.86	84.60
Gun { weight, pounds. wheels { hgt., in. track, "	Prismatic wedge & screw pad Broadwell obturator ring 1268	Inter-rupted screw pad Broadwell obturator 1256	De Bange 1456	Cylindro prismatic wedge 1202	Cylindro prismatic wedge 1201	Cylindro prismatic wedge 1111	Inter. screw De Bange obturator 1272	Krupp 941	Krupp 1257	Krupp 1234	Inter-rupted screw 1331
	54	60	58.7	55.1	55.1	54.9	54.9	52	54.7	56.7	57.75
Weight of { limber, empty. " loaded. gun & lim. loaded. am. wag. body. am. wagon and limber loaded.	905	1221	1119	1201	1201	1065	1065	908	1345	1098	1031
	1918	.....	1786	2016	.....	2028	2039	1365	2227	1907	2648
	4310	4091	4586	4365	4411	4222	4762	2730	4377	4244	4860
	1235	1170	1455	1516	.....	1207	1207	1191	1585	1422	2349
Service charge, pounds..	3.3 { 4. powder or 15 3/4 oz Cordite	3900	4795	4896	.....	4475	4420	3075	4495	4672	5497
	1471	1550	1492	Smoke- less 1.41 { 1375 1450 High ex. 15.5	Smoke- less 1.41 { 1375 1450 High ex. 15.5	3.08	3.08	2.2	3.06	3.3	4.1875
Muzzle velocity, f. s. . . .	13.99	.....	.....	.....	.....	1450	1450	1493	1551	1490	1550
Shell, common, (full) lbs.	7.57	.....	.....	7.76	7.76	7.2	7.2	10.2	13.88	14.58	.....
Bursting charge, oz. ....	15.74	14	19.12	17.78	High ex. 15.5	15.59	15.59	8.8	8.8	7	.....
Shrapnel, (full) lbs. ....	3.19	1.5	4.5	.793	.....	2.2	2.2	9.6	13.23	14.45	20
Bursting charge, oz. ....	165	235	160 + 77 segments	262	300	165	165	0.35	.....	0.6	14.5
Number of bullets, . . . .	.....	.....	.....	.....	.....	.....	.....	90	92	177	218 + 62 fragments

TABLE III. FIELD ARTILLERY.—Continued.

Description.....	Austria-Hungary	England	France	Germany		Russia		Spain		Italy	United States
	Field Art. 9 cm., 1875	15 pr. B.L. 7 cwt.	Field 9 cm	Heavy field, c. 73	New field, C/73/91	Light field	New light field, 1892	Field 8 cm.	Heavy field 9 cm.		
Number { one gun and of rounds { limber.....	32	38	27	32	.....	30	.....	34	33	36	42
on { wagon.....	96	72	77	82	.....	80	.....	82	73	96	126
Per battery.....	1204	600	855	848	.....	1236	.....	696	636	792	1386
Number of wagons.....	6	6	9	8	.....	12	.....	6	6	6	9
Number { per gun..... of horses { " wagon.. { " battery.	6	6	6	6	.....	6	.....	4	6	6	6
	6	6	6	6	.....	6	.....	4	6	6	6
Number { personnel..... per { guns..... battery { wheeled car..	200	182	194	175	.....	234	.....	164	183	166	180
	8	6	6	6	.....	8	.....	6	6	6	6
	22	16	18	19	.....	29	.....	.....	19	15	17
					.....	174	.....	134	164	116	{ 149 144
Effec. range, sh'r pn'l, yds.	3750	max. 4000	6120	3770	4920	3830	3830	.....	2840	4400	.....
Effective range, elevation.	9°.26	.....	18°.46	10°.1	15°.30	.....	.....	.....	.....	13°.4	.....
Rifling, one turn in. calibre	1/15	1/10 to 1/28	1/25.58	1/50	1/50	1/30 to 1/40	1/30 to 1/40	1/30	1/35	1/35	1/30 to 1/25
Number of grooves.....	24	18	28	24	24	24	24	24	24	20	26
Means of rotating projectile.....	Copper rings	Copper driving bands	Copper driving ring	Two copper rings	Two copper rings	Copper bands	Copper bands	Copper driving ring	Copper driving ring	Copper driving ring	Copper band
Kind of vent.....	Vertical	Radial re-movable with T head	Axial	Oblique through wedge	Oblique through wedge	Oblique through wedge	Axial	Vertical	Vertical	Vertical	

NOTE.—In England the number of rounds given was that used for the 12 pr. gun. France formerly had an 18 lb. shell containing 7.06 oz. bursting charge. The new light Russian field-gun is to be used also for horse artillery. For this gun, for field service, the initial velocity is to be increased about 325 f. s.; the shell to have greater number of bullets and to be of steel; the carriage to be new with strong recoil devices; and to be capable of firing about 4½ aimed shots per minute. The marked difference between total length and bore length of the Russian 4.23 and new 3¼.45 appears incorrect.

TABLE IV. ORGANIZED FIELD ARTILLERY.

	No. of Batteries		No. of Guns per battery		No. of Officers		No. of Men		No. of Battery Horses	
	Peace	War	Peace	War	Peace	War	Peace	War	Peace	War
*Austria-Hungary.										
Horse artillery . . . . .	16	.....	6	6	5	5	122	187	105	218
Field artillery . . . . .	224	.....	4	8	4	5	101	195	39	136
Mountain artillery . . . . .	14	.....	4	4	4	3	86	101	20	53
†Belgium.										
Horse artillery . . . . .	4	4	6	6	4	5 or 7	107	183 } 180 }	.....	.....
Field artillery . . . . .	30	30	6	6	4	5	86	166	.....	.....
‡England.										
Horse artillery . . . . . {	5	.....	4	6	4	5	136	179	.....	.....
	16	.....	6	6	5	5	162	179	.....	.....
Field artillery . . . . . {	32	.....	4	6	4	5	136	170	.....	.....
	55	.....	6	6	5	5	101	170	.....	.....
								152	.....	.....
Mountain artillery . . . . .	9	.....	6	6	5	5	106	to 208	.....	.....
France.										
Horse artillery . . . . .	52	.....	6	6	5	4	105	185	87	212
Field artillery . . . . .	421	.....	6	6	5	4	103	190	61	156
“ “ African . . . . .	4	.....	6	6	4	4	153	190	134	156
Mountain artillery . . . . . {	10	.....	6	6	5	4	103	195	19 } 42 }	34 66
“ “ Alpine . . . . .	13	.....	6	6	5	4	155	196	16 } 80 }	34 66
“ “ African . . . . .	8	.....	6	6	4	4	238	248	27 } 140 }	27 140
Germany.										
Horse artillery { low . . . . .	23	.....	4	6	4	5	91	170	76	.....
“ “ medium . . . . .	4	.....	6	6	.....	.....	to		to	.....
“ “ high . . . . .	20	.....	6	6	.....	.....	120	120	.....	.....
Field artillery { low . . . . .	182	.....	4	6	4	5	107	170	44	.....
“ “ medium . . . . .	214	.....	6	6	.....	.....	to		to	.....
“ “ high . . . . .	57	.....	.....	.....	.....	.....	120	120	75	.....
Holland.										
Horse artillery . . . . .	2	.....	.....	.....	4	.....	65	166	127	180
Field artillery . . . . .	18	.....	6	.....	4	.....	65	161	.....	70
Italy.										
Horse artillery . . . . .	6	.....	6	.....	4	4	120	150	.....	.....
Field artillery . . . . .	186	.....	6	.....	3	4	90	124 } 162 }	.....	.....
Mountain artillery . . . . .	15	.....	6	.....	4	6	140	280	.....	.....
Russia.										
Horse artillery . . . . .	48	.....	6	.....	5	5	173	198	.....	.....
Field artillery, light . . . . .	215	.....	4	8	6	6	179	227	.....	.....
“ “ heavy . . . . .	112	.....	4	8	6	6	207	259	.....	.....
Mountain artillery . . . . .	21	.....	4	8	6	6	149	300	.....	.....
“ “ (horse) . . . . .	2	.....	6	6	.....	.....	.....	.....	.....	.....
Field mortars . . . . .	26	.....	6	6	5	.....	175	226	.....	.....

\* On mobilization 56 field, 16 mountain and 4 narrow gauge batteries may be added. Actually in time of peace there are only 92 men and 42 horses in a field battery, except in 3 batteries where there are 124 men and 70 horses. The mountain batteries of the corps artillery have an addition of 9 privates and 18 horses each.

† These are in addition to reserve batteries and 4 depot batteries.

‡ In addition there is a depot battery each of horse, field and mountain artillery. There are 10 horse batteries, 46 field batteries and the three depot batteries serving in England, the others in India save one mountain battery in South Africa.

This gun fires a 15-lb. projectile—common shell, shrapnel or case. The shrapnel contains 232 bullets and is given 1200 f. s. muzzle velocity. The objection heretofore urged against the gun is that the weight of the projectile reduces the number of available rounds to about one-half per mule as compared with the number now carried for the present 2.5" muzzle-loading gun. It is thought, however, that the number of mules used for transportation of ammunition could be increased from 6 to 10 and thereby provide 80 rounds of ammunition per gun as against the 96 now carried by the six mules used,—and that this difficulty of increased transportation would be more than counterbalanced by the destructive effect of the 15-lb. projectile. These arguments may not prove unacceptable to the English and result in their adopting a mountain gun with ammunition interchangeable with their present field-gun, which fires a 14-lb. projectile.

It is stated by good authority that the Austrians now have a 2.75" mountain gun, of divisible model, 1885, weighing 420 lbs. The De Bange mountain gun of the French is an excellent gun, requiring four mules for transportation against five for the English jointed gun. This gun, whose projectile has great initial energy and retains satisfactory velocities at fighting distances, satisfies almost perfectly the conditions of maximum effectiveness and facility of transportation of mountain artillery and may be considered a typical mountain gun. It has been closely followed by the Mexican government, whose mountain gun is made of steel and on the De Bange system.

#### HORSE ARTILLERY.

The most recent changes in matériel for horse artillery is that begun in Austria in 1894 by arming it with a 3.42" gun almost identical with their new field-gun of that calibre, save that it is shorter, weighs 170 lbs. less, and is provided with a lighter brake and has no axle seats.

This change amounts to a practical conclusion by the Austrians that the horse-artillery gun should have the same power and effect as that of the ordinary field-gun, and should depend for its extra mobility on its gun detachment being mounted. If this does not give sufficient mobility it would be better to add an extra team, even if two of the cannoneers are mounted on off leaders or on the limber chest, than to sacrifice power of the gun.



Horse artillery must be able to accompany cavalry in exploring for the enemy, as well as in other special duties, and to support it in its stationary actions, but above all, horse artillery must be able to take its place with other field artillery in line of battle in fighting to gain victory—a duty which requires a gun of the same calibre and power as ordinary field artillery whereby ranging and ammunition supply is simplified, and repairs on the battle-field facilitated. This view may seem to rule out the use of horse artillery to support cavalry in its attack on cavalry and to hold itself in constant readiness during battle for supporting cavalry in the latter's hoped-for phase of battle whereby cavalry masses will apparently decide the action. It must be remembered, however, that horse artillery has work to do while cavalry is awaiting opportunities, and that its use in supporting cavalry is only incidental. In examining the table it is noticed that Germany has no gun distinctively known as a horse-artillery gun. The light field-gun has therefore been given as the horse-artillery gun, but as the total weight of the new field-gun, model 1891, with 32 rounds of ammunition per limber is undoubtedly less than the light field-gun with the same number of rounds it is not unlikely that the '91 gun will be the future armament of their horse artillery.

The light field-gun of the U. S. (795 lbs.) appears from table II to be the best horse artillery gun extant, as even its 13.5 lb. shrapnel furnishes over 200 bullets and fragments, while the draught per horse with 42 rounds per limber is only 626 lbs.—a combination unequalled for power and mobility by any other nation's horse artillery, and rendered more effective by use of the new shrapnel and smokeless powder.

#### FIELD ARTILLERY.

Turning to field artillery proper and leaving out of consideration the heavy Russian 4.2" gun and the U. S. 3.6" gun it is found by the table (III) of field artillery that the field-gun of France is heavier than that of any other nation and that it fires a heavier projectile, so that the weight per horse behind the team is 765 lbs. or about 40 lbs. per horse more than the maximum to insure sufficient mobility. Maximum projectile effect coupled with sufficient battery mobility is the end toward which field equipment has tended and the results obtained have been reached through use of guns of less than 1000 lbs. weight firing projectiles relatively heavy with lower muzzle velocity,

Thus for the light 3.2" field-gun of the U. S. the shrapnel has been changed from 13.5 lbs. to 16.5 lbs. and the muzzle velocity reduced from about 1685 to 1450 f. s. A similar change has been made by Germany. Russia however is expecting to secure higher remaining velocity by about 100 metres, made possible by strong recoil checks and by use of a rear bursting charge in the shrapnel. The 3.2" gun of the U. S. can stand a higher velocity than 1450 f. s., probably up to 1600 f. s. if recoil be controlled. General Rohn of the German Artillery describes as his idea of a model field-gun "a 3.2" gun firing a 15.1 lb. shrapnel with an initial velocity of 1575 f. s. He gives this as a mean between the limits he fixes of a 16.5 lb. projectile with an initial velocity of 1640 f. s. and a 14.15 lb. projectile with an initial velocity of 1840 f. s. with weight of gun at 924 lbs. Consequently our 3.2", by proper control of recoil and by improvement in arrangements for laying with perhaps a slight addition of weight might very well be selected as a model field-gun. At present the recoil and jump of the carriage is about 11 feet with brakes on—a serious trouble and one which would soon tire out cannoneers and render prolonged firing and readiness to fire very difficult. Assembling in one table the data, from the tables of horse artillery and field artillery, as to calibre, weight of shell, weight of shrapnel, initial velocity, number of bullets in shrapnel, and load per horse, we have the following direct comparison of guns of certain nations. (See table on page 510.)

#### RAPID OR QUICK-FIRE FIELD-GUNS.

During the past two years there has been made marked advancement in the development of rapid or quick-fire guns with suitable mounts for field-artillery. The earlier idea was to develop a quick-fire field-gun, using a light projectile, and firing several shots without being relaid, but this end is no longer sought. Experiences of manufacturers have demonstrated that only with relatively very small calibres can recoil be absorbed within manageable limits, and as a very slight movement in recoil or in jump of the carriage is fatal to accuracy of fire in the succeeding shot as an unaimed one, the idea that a quick-fire field-gun need not be relaid before each shot has been abandoned as impractical.

It has also been thought that protection of gun detachments by steel shields from small-arms fire might enable guns to come into action at from 1000 to 1500 yards, whereby a rapid-fire gun and mount could be devised for low initial velocities of projec-

NATIONS.	FIELD ARTILLERY.						HORSE ARTILLERY.					
	Calibre.	Weight of Shell.	Weight of Shrapnel.	Initial Velocity.	Load per Horse.	In limber No. of Rounds.	No. of Shrapnel Bullets.	Calibre.	Weight of Shell.	Weight of Shrapnel.	Initial Velocity.	Load per Horse.
	inches.	lbs.	lbs.	f. s.	lbs.	No. of Rounds.	No. of Shrapnel Bullets.	inches.	lbs.	lbs.	f. s.	lbs.
Austria.....	3.42	13.99	15.74	1471	735	32	165	2.95	9.51	10.51	1386	594
England.....	3.00	....	14.00	1550	694	38	235 with frags.	3.00	....	12.5	1550	647
France.....	3.54	....	19.12	1492	764	27	237	3.15	....	13.5	1608	576
Italy.....	3.4	14.58	14.90	1458	708	36	177	2.9	9.56	9.4	1416	586
Germany (new)....	3.46	15.5	15.5	1450 (1800)	734	32	300	3.46	15.5	17.78	1450	564
Russia { Light....	3.42	15.23	15.59	1450	696	30	165	3.42	15.23	15.59	1351	596
{ Heavy....	4.23	27.64	28.13	1227	794	18	340					
Spain.....	3.29	13.85	13.23	1551	730	33	92 frags.	3.09	13.89	....	1509	566
United States { Light....	3.2	13.5	13.5	1685	626	42	208	3.2	13.5	13.5	1685	626
{ Heavy....	3.6	....	20	1550	810	42	240			16.5	1450	653

tiles so as to enable a quick ascendancy over a slow-firing, longer range, high-powered opponent. It must be remembered, however, that the gun detachment does not begin its work until after the halt is made for coming into action, and that an advanced skirmish line can bring the artillery to a halt before this degree of proximity to the enemy's artillery has been reached, as was done at St. Privat when the 3000 Chassepôts of the French skirmish line brought Prince Kraft's 54 guns to a halt at about 2500 to 3000 yards from the line to which the French artillery had withdrawn, thereby completely changing that commander's oft repeated views as to the practicability of coming into action at short range, stopping his efforts at that time to close, and causing him then and there to vio-

late his general orders to go into action at 1800 paces or closer.

The artilleryman must have the ability to reach his opponent at long ranges with a projectile of powerful effect, combined with reduced labor for gun detachment, with greatest possible readiness to fire and with suitable draught load per horse to insure sufficient mobility. These conditions must be fulfilled by a quick-fire field-gun and mount, and they have been sought through control of recoil and jump of carriage, through simultaneous laying and loading and through use of fixed ammunition.

It is reported by good authority that about March 11, 1896, the future quick-fire cannon for the field artillery of France was tested at Bourges—a 2.95" gun firing a projectile weighing about 14.3 lbs. Private manufacturers have reached good results. The Maxim Nordenfelt Company have for field artillery a 2.95" quick-fire gun throwing with 1600 f. s. initial velocity a 13-lb. projectile at a draught of 661 lbs. per horse, with 36 rounds of ammunition in the limber, also one firing a 11 $\frac{3}{4}$ -lb. projectile with a draught of 551 lbs. per horse for horse artillery with 42 rounds in the limber. These guns use fixed ammunition, have hydraulic brakes for absorbing part of the recoil and reducing the "jump" of carriage, have automatic brakes on the wheels and carry a light steel shield to protect the "laying number" from small-arm bullets.

Krupp has a 2.95" quick-firing field-gun firing a 14.3-lb. projectile (by highly trained cannoneers) at the rate of from 5 to 6 shots per minute. There is required only slight adjustment of aim for subsequent shots but no running up after firing is necessary.

Russia, actuated by economy and desire for simplicity, has retained the former 3.42" field-gun on a remodelled carriage so as to fire, as is claimed, a 15.23 lb. projectile at the rate of 4 $\frac{1}{2}$  aimed shots per minute. They rely on a trail spade to check recoil and have moved the sights forward on the gun so as to permit simultaneous laying and loading.

There still remains considerable prejudice against fixed ammunition due to dead weight of metallic cartridge case, to danger of ammunition being jammed so as not to function in the gun, and to possibility of premature explosions. In our service efforts to develop a light case of aluminum or aluminum alloy have about been abandoned and a model for a brass case weighing 2 $\frac{1}{2}$  lbs. fixed upon for the 3.2" field-gun, but its use is not settled upon as experiments are being conducted with the hope of developing a non-



metallic waterproof case. Retention of simplicity with control of recoil and jump of carriage, combined with simultaneous laying and loading would even without the use of fixed ammunition result in an ideal quick-fire artillery field weapon. It has almost been accomplished and it is safe to say that it is necessary and that nothing less will satisfy the artilleryman. When without confusion 4 or 5 shots of from 15 to 16 lbs. weight with an initial velocity of 1600 or 1500 f. s. can be fired per minute, reduction of number of guns per battery will follow, resulting in an increased number of ammunition wagons per battery and greater all round efficiency.

#### HIGH ANGLE FIRE IN FIELD ARTILLERY.

The use of field howitzers or field mortars for high angle fire appears to be necessary from the fact that of the artillery phases of battle, namely, beginning the action, the artillery duel, preparing the way for the infantry attack, supporting the infantry advance, and aiding in pursuit or retreat, that of preparing the way for the infantry attack is the one which must be well done if the battle is to be won, and the one which requires effects and not mobility.

It being a principle that a front attack by infantry against unshaken infantry is impossible, there is necessity for a complete preparation of the way by artillery, in fact, a complete battering of the defense not only along the line or point of assault but to its rear over ground occupied by troops in reserve, before such an attack can be possible. When therefore the line or point of attack includes obstacles, such as earthworks, fortified villages, etc., special preparation becomes imperative. In case of villages the ordinary field-gun can be trusted to do the work as was done by 88 guns directed against the village of Marie-aux-Chiens, in the battle of Gravelotte. The penalty for failing to make this preparation is also illustrated in the same battle by the experiences of the Guard in its attack on the village of St. Privat.

The protest made by the commanding officer of that part of the Guard ordered to advance—attested by Prince Kraft's evidence—that the way had not yet been prepared is quite sufficient to show that, although there had been slow and prolonged firing along that part of the line, proper preparation had not yet been undertaken. The protest had to go unheeded because a detached portion of the Guard had already begun the advance.

Can proper preparation of the way for infantry advance be

made in a reasonable time by ordinary field artillery firing ordinary shell, shrapnel, or even small charges of high explosive where the obstacles include earthworks? The practical answer to this question has been the introduction of field howitzers and field mortars, organized into mobile batteries, and the evident intention, especially by Germany, to use foot artillery with heavy howitzers in line of battle by European nations.

France has adopted a 4.7" inch howitzer firing either a steel shell weighing 44.88 lbs., containing 13.22 lbs. of melinite, or a shrapnel of the same weight containing 630 bullets, giving with a maximum initial velocity of 950 f.s. a range of about 5000 yards with angle of descent of 30°. The draught per horse is about 868 lbs. Each gun is provided with 288 rounds of shrapnel and 240 rounds of melinite shell. Each battery consists of six guns and the necessary ammunition and store wagons and is drilled and fought as field artillery.

"The intended effect of howitzer shell is the destruction of earthworks against which the melinite shell of the 3.54" field-gun is considered to be of too little value. The demolition of an earth parapet 9.8 feet in thickness and 7.5 feet high requires, for instance, ten good hits per metre, with 3.54" shells, which would result in an enormous expenditure of ammunition against a fortified position. A fair hit with a 4.7" shell has the same effect, and it may be asserted that it always equals the effect of any 12 shells of the same calibre filled with ordinary powder. Against troops behind thin walls or cover of similar kind the shell acts after penetration of the obstacle, by its scattering débris. Under such conditions the fact of the air pressure produced by the exploding projectile being able to throw down living beings, and to cause them severe internal injuries, is also taken into account together with the destructive agency of splinters. If the explosion occurs in a closed room, after penetration, all the occupants are killed either by the flying pieces or by atmospheric pressure. \* \* \* Its high complement of shrapnel (55 per cent.) points to the intention that it (the howitzer) is also to be used to take part in the artillery fight proper."

Germany has recently adopted for the foot artillery a new 5.9" howitzer drawn by four horses to be used against "large targets under cover as, for example, troops assembled behind villages, woods, undulations of the ground and other obstacles obstructing the view and against hasty fortifications and even

permanent fortifications at great distances." It is reported that a 4.7" field howitzer is to be tried. Russia and France previously have adopted field mortars with which to effect these objects. Austria has recently abandoned them and together with Germany expects to use high explosive shell from the field-gun against the point of assault. Turkey and Brazil have also adopted howitzers, while England contemplates establishing, in addition to her heavy field and howitzer batteries in India, two heavy field batteries, at home, armed with 4.7" or 5" howitzers. Can men sitting immediately behind cover be effectively reached by any kind of fire? Certainly infantry and infantry fire are ineffective to shake them. High explosive shell and common shell from flat trajectory field-guns would require very accurate firing against a small vertical target. The firing of shrapnel would keep down the fire of men so concealed, but the approach of one's own infantry would require the abandonment of such fire and leave the enemy unshaken at close range. A general in command should have a reserve power which carries moral and physical force of a decisive nature and which would enable him to break the enemy's line when once the fight has sufficiently developed to indicate to him the desirable point of attack, consequently large projectiles filled with great bursting charges of powder or high explosives and fired with reduced charges present themselves as a more rapid means to the end sought. Mortars are inadequate through lack of accuracy in range to fire these projectiles. A longer gun is necessary. Our 3.6" heavy field-gun is noticeably inferior to the Russian 4.23" heavy field-gun in projectile effect. Taking into consideration that Russian experiments showed their 4.23" gun was only about half as effective as their 6" field mortar, and that our 3.2" field-gun with a 16.5-lb. shrapnel has enough power to settle combats where animate objects are in view, that our 3.6" field mortar fires a small projectile, very inaccurate as to range, it seems to follow that the U. S. 3.6" field-gun and the 3.6" field mortar should be replaced by a 5 inch howitzer firing projectiles,—both shell and shrapnel,—weighing about 50 lbs.

#### ORGANIZATION AND ARMAMENT OF FIELD ARTILLERY.

In field artillery proper the battery is the fire unit and the battalion of three or four batteries the tactical unit that is the manœuvring and fighting unit.

Formerly a single gun was considered the unit of fire and the battery the tactical unit, but now the battery commander has been relieved of giving his attention to the tactical situation by the battalion commander, who in addition selects and reconnoitres positions, designates objectives, controls the rate of fire, and keeps in touch with the commanding officers of the troops with which he is serving.

These changes have been brought about by the facts that the guns have become accurate and uniform in shooting quality, that a single battery is too weak to perform alone the work required of it on a modern battle-field, that the number of guns employed is very great and that it is necessary for the artillery to act in masses. A fundamental principle which determines the amount of artillery organized in peace is that there should be in existence as many batteries as the nation would ordinarily need, when its tactically organized armies are placed on a war footing.

Economy during peace usually causes a reduced number of guns and men in a battery—an allowable reduction as expansion of an already existing unit is practicable, especially where all required matériel and equipment are in store, but creation of efficient new units is not possible within the time available between call for mobilization and conflict.

The amount of organized field artillery in the armies of the principal nations, with battery organization and strength is given in table IV.

The war strength of a field battery, proper, in Austria and Russia is 8 guns, in all other armies it is 6 guns. It is believed that a battery of 8 guns is too large and would frequently have to be divided, as has been done during firing, to render its being efficiently handled. In fact the admitted excuse for its existence is economy alone.

There seems to be a growing tendency to favor four-gun batteries. It is now possible with the new Russian field carriage to fire with the 3.42" gun  $4\frac{1}{2}$  shots per minute, a rate which can easily be attained by rapid loaders or quick-fire guns now being developed and contemplated by various nations as the armament for their field batteries.

A much slower rate of fire than  $4\frac{1}{2}$  shots per minute would enable a four-gun battery to fire faster than the time of flight of the projectile and time consumed in observation of shot would permit. Consequently a greater number of guns could not be



effectively fought by a captain. A four-gun battery could deliver by piece as many aimed shots per minute as a six-gun battery. Therefore if 24 guns be organized into 6 batteries of four guns each instead of into 4 batteries of six guns each there would result two extra batteries which could be used for concentration of fire and thus enable ascendancy over any particular six-gun battery selected. It is claimed that the true function of a rapid-fire gun is to insure intensity of fire in certain extreme cases, but this is hardly correct. An ordinary field battery can by use of fire at will and rapid fire defend its own front from direct attack if the ground be not disadvantageous. The same intensity can be obtained from the guns organized into four-gun batteries as though organized in six-gun batteries, while the former organizations permits more efficient fighting of all the guns.

A four-gun battery is almost too small to withstand any of its pieces being rendered unserviceable or of being temporarily detached, but it is the exception that a piece is more than temporarily disabled and the system of detaching guns from a battery for raiding purposes is rather a vicious than a desirable one.

Four-gun batteries were used during our late rebellion in Sherman's march to the sea and during the Wilderness campaign. In the first instance, in order to have 8 horses per battery and in the last case on account of the wooded country, but it remains as a fact that the four-gun batteries were chosen in preference to a lesser number of six-gun batteries.

The number of guns per army corps ought not be reduced, consequently the arguments that the four-gun battery would result in reducing the length of column in march and the front of battle are not very sound ones.

For horse artillery, under any circumstances, mobility, flexibility and necessity as to number of guns seem to fix the four-gun battery as the proper organization.

In either field or horse artillery this organization would render easier the control of fire and instruction in war tactics. Two things are certain, a four-gun battery organization would enable batteries to be so well officered as to secure excellent fire discipline and result in a healthy organization by reducing the number of subaltern officers per battery, thus tending to keep younger officers in command and in performance of duties suitable to their years.

Batteries are organized in battalions so as not to bring over 24 guns under the command of a battalion commander. With increased rate of fire this will doubtless prove too great a maximum number. The distribution of guns in an army corps is 24 guns to each of the 3 infantry divisions and 48 separately organized as corps artillery. Discussion of the question as to whether it would not be better to distribute all the guns to the divisions is being renewed. All artillerists favor bold and early employment of the guns, the real question being by which system of distribution can this be best done. Adherents of the corps artillery advocate its retention on the ground of the facility it gives in handling masses of artillery. At Sedan and at St. Privat unexpected and prompt arrival of the corps artillery at the front resulted in moments of great pride to Prince Kraft. Our regulations permit the divisional artillery of the rear divisions to be concentrated and march, when there are more than two divisions, at or near the head of the second division, and prescribe that as soon as the direction to be given the attack can be determined, the divisional artillery is to be detached from its division and brought to the front to strengthen the artillery line. These arrangements seem to facilitate all the artillery passing to the control of the corps commander, through his chief of artillery. When the divisions march on separate roads, distribution of the guns to the division would undoubtedly facilitate prompt and bold deployment on the line. The main points are to keep the artillery to the front without depriving the commanding general of having a preponderance of strength at the decisive point. A distribution of 36 guns to each division, with a corps artillery of 12 guns of mobile 5-inch field howitzers, supplied with about an equal number of rounds shrapnel and of shell, filled with great bursting charges, would seem to be a satisfactory arrangement for attaining both ends.

## THE NATIONAL GUARD NATIONAL IN NAME ONLY.

BY LIEUT. COLONEL WALTER S. FRAZIER, JR.,

ASSISTANT ADJUTANT GENERAL, ILLINOIS NATIONAL GUARD.

**A**LTHOUGH much is written nowadays concerning the possibility of war involving the United States, comparatively little attention is given in print to the subject of military readiness for the defensive or offensive except within army circles. The average citizen shrinks from the thought of war, but is supremely confident that Uncle Sam can lick any other nation on earth if he sets about it. Still, this confidence is seldom based upon more than a good digestion and a desire that a conflict should so result, and it would seem well that everything relating to the question of readiness should have free and extended discussion.

But little is heard concerning that military force—which is of equal importance with the army—the National Guard or organized militia. In no other country on the globe could a civilian-by-day—soldier-at-evening force,—such as our National Guard necessarily is, be considered of equal military importance with the Regular, professional army. But the conditions in the United States are unique. Both by law and public opinion, which insures a continuance of the present or similar laws, is this country restricted to a small Regular Army in times of peace, and as soldiers are not made and accoutred in a day or month, it follows that should an emergency be presented requiring the employment of as large a force as was asked for in President Lincoln's first call, the only source that could furnish the requisite number of other than green men would be the National Guard—the modern minute-man service.

Inasmuch as the present numerical strength of the Guard is about five times that of the Army, the statement that it ought to be considered of at least equal importance seems a fair one, the higher degree of efficiency which the Army has been able to attain and maintain because of its singleness of purpose, made possible by governmental support, being counterbalanced by the greater strength of the Guard.

It is not the purpose of this article to laud the Guard, to attempt to add to the dignity of its service, or to demonstrate its readiness for action, but rather to call attention to some of its innate defects, in the belief that with a general knowledge of these shortcomings and an appreciation of their importance there cannot fail to be developed a widespread demand for betterment.

Although most of the States use the word National in designating their organized militia or guard, the appellation is something of a misnomer, for there exists no national control or supervision, no uniformity of instruction, organization, or equipment, and in none of the States is either the enlisted man or officer obligated by the terms of his enlistment or oath of office to serve the United States.

This question of enlistment contract is an important one. While the President is *ex-officio* Commander-in-chief of the militia when called into the service of the United States and can make requisition upon the governor of a State for a certain number of regiments or men, there is no assurance under present conditions that the men or regiments he would get in such an event would be such as have had National Guard training, or that the benefits of existing company, regimental, and brigade organizations would inure to the advantage of the nation; for the members of the Guard have obligated themselves to serve the State, not the National Government, so it must remain optional with every Guardsman, unless drafted, whether or not he shall serve his country, in the absence of the national legislation on the subject. His standing is that of a civilian. The inevitable result of this would be a changing about in the personnel of officers and men upon entering the service of the nation that would impair the acquired efficiency to a serious extent.

The militia law of 1792, which is nominally still in force, defines the militia as consisting of all able-bodied male citizens between the ages of eighteen and forty-five except those following certain callings who are specifically exempt. This law makes it the duty of the company commanders chosen by the States to enroll all those subject to military service under the law, and a fair interpretation would seem to be that a man is not a member of the militia until so enrolled. It might be held that the failure to enroll is simply negligence on the part of the officers which cannot alter the fact of liability, and that the militia consists of



all liable to military service whether enrolled or not, but the first interpretation is held to be the better one. There are no such enrollments nowadays and therefore there is no national militia. With this interpretation of the law it follows that were the President to exercise the power conferred by the section—" \* \* \* it shall be lawful for the President to call forth such number of the militia of the State or States most convenient to the place of danger or scene of action as he may deem necessary to repel such invasion or to suppress such rebellion and to issue his orders for that purpose to such officers of the militia as he may think proper," such orders would apply with equal force to all subject to military duty within the jurisdiction of the officers designated and that any attempt to select National Guardsmen or any National Guard organizations as being solely subject to such orders would be illegal.

New York has her infantry armed with the Remington rifle; Connecticut has all but one regiment armed with the Peabody; Florida, Virginia and Wyoming have some of their men armed with .50-calibre Springfields; while all of the other States have the .45-calibre Springfield, and the infantry regiments of the army are equipped with the Krag-Jorgensen magazine rifle. These rifles require different manipulation and ammunition, complicating the problem of ammunition supply in active service.

Brigades are authorized in some States and in others not. When authorized there is a great variation in the number and rank of staff officers.

There is but one major authorized for each regiment in Arkansas, Virginia, Texas, Louisiana, Montana, Nevada, New Jersey, Washington, Wyoming, New Mexico and Minnesota, so that it is of course impossible to have more than two battalion regiments in these States, and two are only possible when the lieutenant-colonel commands a battalion. Kentucky, Michigan, Missouri, New Hampshire, North Carolina, North Dakota, Rhode Island and Oregon allow two majors to each regiment, while most of the other States have adopted the three battalion regimental formation, each battalion (commanded by a major) being composed of four companies. In this connection it seems pertinent to express regret that Congress has never recognized the present drill regulations to the extent of authorizing for the army the formation made mandatory by them, and put an end to the anomalous, conflicting condition now existing.

Not more than eight States have supplied their troops with field-cooking outfits.

Company officers, who are elected by the members of the companies in all the States, are given commissions regardless of their fitness, in at least eighteen States.

What then is manifestly needed is national supervision. Uniformity is in no line more essential to efficiency than in military organizations. Uniformity or unity of purpose is in fact the distinguishing difference between an army and a crowd, between military efficiency and the lack of it. The question is naturally raised whether any changes for the better are practicable, without infringing upon the prerogatives of the States, or increasing the appropriation for military purposes. The times are such that no proposition involving an increase in appropriations is likely to receive favorable consideration in Congress, and the Army, like many citizens, is chronically short of funds, so that any attempt to secure an increase in the amount now divided among the State for militia purposes would doubtless be opposed by strong influence.

As the prime reason for the existence of the National Guard is and must always be the defense of the nation, national supervision seems not only eminently proper but essential, in order that the maximum defensive power may be secured with the minimum expenditure for militarism. A wealthy, defensively weak republic invites dissolution by attack from without, while on the other hand, a republic strong in a military sense, on land and sea, is ripe for imperialism or war of aggression. No other force can be so potential for preserving a mean between these extremes as an efficient citizen-soldiery trained to fight to preserve peace,—to use a paradoxical expression.

The custom obtains in this country of nationalizing all institutions when it becomes apparent beyond question that lack of national supervision results in injustice or weakness in a national sense. Although the National Banking Act was based upon the existing needs of the treasury, it had its inception in the fact that the welfare of the people was best conserved by federal control.

The Inter-State Commerce Law is another illustration of this tendency toward a centralization government—of the development from a federation of self-assertive States of a strong republican nation.

Mr. Jas. Bryce in his remarkable work, "The American Commonwealth," says:

"It is nevertheless impossible to ignore the growing strength of the centripetal and unifying forces. There is an increasing tendency to invoke congressional legislation to deal with matters, such as railroads, which cannot be adequately handled by State laws. \* \* \* In the United States all the elements of a national feeling are present, race, language, literature, pride in past achievements, uniformity of political habits and ideas, and this national feeling which unifies the people is reinforced by an immensely strong, material interest in the maintenance of a single government over the breadth of the continent. It may, therefore, be concluded that while there is no present likelihood of change from a federal to a consolidated republic, and while the existing legal rights and functions of the several States may remain undiminished for many years to come, the importance of the States will decline as the majesty and authority of the National Government increase."

The Constitution confers upon Congress the power to provide for organizing, arming, and disciplining the militia, reserving to the State governments the appointment of the officers and the authority of applying the discipline prescribed by Congress.

The jurisdiction of Congress therefore appears unquestionable. What is needed is a Federal Militia or National Guard law creating a distinction between the organized militia and the unorganized militia, making it mandatory for the States to organize, equip, and maintain National Guard forces proportionate in size to their representation in Congress, specifying methods of organization, details of equipment, and scope of instruction, providing a uniform enlistment contract, requiring thorough inspection at stated intervals.

This supervision should, of course, be exercised through the War Department. But the Guard should be coördinate with rather than subordinate to the Army, and the arms and equipment for both services should be identical.

An enlistment contract embodying the idea of dual obligation and service should read about as follows:

I solemnly swear that I will bear true allegiance to the United States and the State of New York, and that I will support the Constitution thereof, that I will faithfully serve the United States and the State of New York, in the National Guard of the State

of New York, for the period of three (or five) years unless sooner discharged, that I will obey the orders of such officers as may be placed over me, and the laws of the United States and the State of New York governing the National Guard forces.

Two yearly inspections should be provided for, one of them to occur during the annual encampment and the other at home stations during the fall or early winter when military discipline and instruction are very apt to be ebbing, particularly in the case of detached companies, which constitute a very large portion of the National Guard. The larger the command remaining intact during the year, the easier is it to maintain that *esprit de corps*, without which no good work can be accomplished in an amateur, unpaid organization, and the smaller the detachment the greater the necessity for thorough inspection.

But these are matters of detail which can be readily determined upon when once the nationalizing of the Guard is begun.

That Army Officers who have opportunity for observation become impressed with the necessity for Federal control is shown by the following extract from a report of Capt. H. O. S. Heistand, 11th Infantry, a discerning officer, who has been on duty with the Ohio National Guard for several years:—

“What is needed by the National Guard, not only of Ohio but of the entire country, is to be nationalized to the extent that all will be governed by the same laws and regulations, armed with the same arms, and clothed in the same uniform.”



## RECENT DEVELOPMENTS IN HORSE-SHOEING.

BY LIEUT. MELVIN W. ROWELL, 10TH U. S. CAVALRY.

THE rapidly increasing use of asphalt and other pavements in cities has created a demand for a serviceable horse-shoe which will prevent slipping when pavements are greasy or covered with ice ; for the claim that the horse will, without further artificial aid, eventually become so accustomed to such surfaces as to be able to properly perform his work thereon is hardly to be credited. Meanwhile, should a shoe designed with this purpose in view incidentally lessen the shock of the hoof in striking the ground and also prevent the injurious contraction at the heel of the hoof, arising from standing on the dry stall floors in overheated city stables and frequently from faulty shoeing, the period of useful service of city horses would be greatly increased. It is apparent that for general use a non-slipping horse-shoe must be serviceable, reasonably economical, and of such simplicity that it can be set by any blacksmith. Whatever the form of shoe believed by horse owners to be best suited for this purpose it is to be expected that conservative blacksmiths, being fond of carving and mechanical construction, will stubbornly oppose any progress which tends to reduce them to mere setters on of shoes.

The plain steel shoe fulfills its function in presenting a hard surface for wear ; it does not prevent slipping upon pavements nor does it destroy shock. The shoe with calks is largely used to prevent slipping and particularly to give hold, or purchase, for heavy-draft horses. It sometimes tears off and frequently causes corns, sprains, and wrenches. As the calks soon wear down it does not long prevent slipping upon smooth or greasy surfaces ; moreover, the wearing away of the toe calks first, elevating the heels, increases the liability to navicular disease. In both of these shoes the functions given by nature to the frog and other structures of the hoof to reduce shock and prevent slipping are not made use of and there soon results, from the drying out of horny structures and often from the knife of the blacksmith who delights in cutting away the frog and in paring down to a mere film the arched sole, a contraction at the heel frequently accompanied

by serious complications. The attachment of the shoe to the foot by means of nails driven through the wall of the hoof seems to be a necessary evil, although recent experiments abroad with a nailless shoe are said to have been successful. Theoretically the Charlier shoe, or tip, permitting the use of the frog as in nature, would be an excellent means to prevent slipping, but it is not believed that the bare frog, already subject to deteriorating influences in city stables, is able to withstand the severe shock of hard pavements, while the dangers of bruises and punctures of the frog and sole are increased.

To meet the conditions imposed by city pavements there have recently appeared shoes in which rubber is used in one way or another. At first a rubber pad was placed over the bearing surface of the foot and slightly projecting below the ground surface of the steel shoe which was set as usual, the nails passing through the rubber; but owing to the resiliency of this substance the nails were soon drawn. Next might be noted a steel shoe of special design, placed upon the foot as usual, a groove in the ground bearing surface of the shoe holding a strip of rubber. As the rubber soon wore down and was expensive to replace this pattern was not successful.

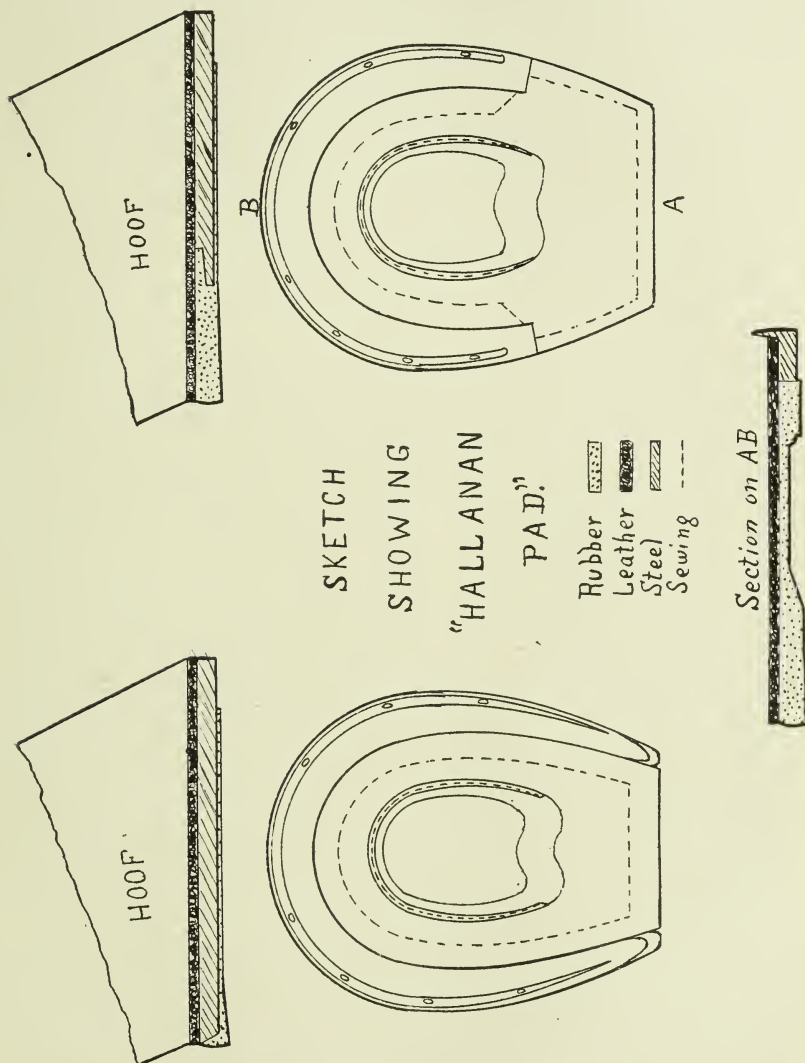
At present rubber-pad, steel shoes are coming largely into use in New York and vicinity during the winter months. The serviceability and other merits of one form of these shoes, known to the trade as the "Hallanan pad," have impressed me so favorably that I will describe it in detail. First the foot of the horse, prepared by *rasping down the seat of the shoe only*, is covered with a mixture of tar and oakum which fills the cavities presented by the sole and heels. Over this is placed a leather covering, not quite one-quarter of an inch in thickness, which covers the entire bearing surface of the foot. The common steel shoe, or the steel tip, rests on this leather covering opposite its usual seat, the nails being driven as in ordinary shoeing and through the leather. A pad of rubber and canvas is stoutly attached to the leather covering and covers it completely, except such portion as is occupied by the steel shoe. The pad is thicker at all points, except a concavity in the centre near the point of the frog, than the steel shoe, and being of greater relative thickness at the heel more elasticity is given at this point, as in nature. When the steel tip is used, and this form I believe to be the best, by cutting half way through the tip at the heel a projection

about three-quarters of an inch in length is formed, which, resting on a corresponding raised portion of the pad, supports and holds firmly in place the heel of the pad—the pad in this case being extended laterally so that its outer limit in plan coincides, in rear of the line joining the heels of the complete upper portion of the tip, with the outer edge of the leather covering.

It is evident that we have here a shoe which will not only prevent slipping within reasonable limits, but that this form of shoe in reducing shock assists and brings into play to a large extent the important functions of the frog and plantar cushion as intended by nature, and that the danger to the hoof of contracting through dryness and other causes is avoided. The principal objection which will be raised to such a shoe is founded upon the undue heat and retention of moisture caused by the closed leather covering and the packing of tar and oakum which has been used to insure a proper bearing surface. Without question the frog and horny sole will be softened, but as far as I have been able to ascertain no injurious results have followed therefrom; yet, if after long and continuous use of this shoe such should be the case, it might be expected that those horses would suffer most whose horny structures had previously been impaired by the misuse of the blacksmith's knife. At any rate, it is believed that this condition of moisture is less harmful than the many evils at present produced by the heat and dryness of city stables and by faulty shoeing. While in well-regulated stables the shoes are removed, the hoofs rasped down, and the horses reshod (shoes frequently being reset) once every three to five weeks, the Hallanan pad is often left on from five to six weeks with results which do not appear to be injurious. This shoe has now been in use for some time and no harmful results are known to have followed from this feature of moisture even in those cases where the shoe has been worn continuously for two-thirds of the year without being removed oftener than once in five weeks; in fact, the very reverse is reported to be the case, and instances have been observed in which horses afflicted with corns or navicular disease to an extent of being almost useless, have, through this shoe, been so far relieved as to be continued in use.

The Hallanan horse-shoe pad has received the endorsement of the fire departments of large cities, of prominent veterinarians, of humane societies, and of well-known horse owners as to its merits with respect to the uses for which it was designed. It is

coming much into use for coach horses and for other types of city horses and is used exclusively (the steel tip form) by the fire departments of New York, Brooklyn, Newark, N. J., and Montreal, Canada, in which services it has given universal satisfaction. Dis-



interested firemen and drivers speak very highly of its merits, saying that where their horses drawing heavy trucks were wont to timidly slip and slide, scrambling for footing, they now get along safely and without fear. The nature of the work demanded



of fire horses over every kind of city pavement is perhaps the best test of the serviceability and efficiency of this shoe. With respect to coach horses I have frequently observed that the fore feet alone were shod with a pad, the hind feet being shod smooth or with calks, a practice which is not only economical but reasonable, for it is here (forward) that the principal weight is borne and here that the horse first "staves up." Yet the shoeing of the hind feet also with the rubber pad is considered essential where any load has to be drawn over slippery pavements or when much stopping and starting thereon is necessary.

As for the mounted service, the saddle horse is no more able to perform his work on slippery surfaces than the draft horse, while the shock upon his fore feet due to the weight he carries is much greater. In the limited field of use in which a rubber pad is particularly serviceable to mounted troops the cavalryman's objection on the old ground of "an ounce at the foot is a pound at the shoulder" is of little importance, although a more serious objection is found in the increased expense, as the cost of these pads, exclusive of steel shoes, is about three dollars per set of four. On the other hand, it will be observed that horses shod with a pad cannot tear each other up by that incessant kicking which occurs at the picket line, and that the covering of the entire foot protects the frog and sole from bruises and punctures by nails, stones, glass, and other objects which troops doing much service in and around cities must expect to ride over. Although the general needs and present local conditions of the mounted service do not demand the constant use of this type of rubber pad horse-shoe, it is believed that conditions might arise where its temporary use would not only be a benefit but a necessity, for it may not be going too far in saying that occasions are possible where the activity and efficiency of cavalry and light artillery in cities would for a time be vitally impaired by the lack of such a shoe. At any rate, asphalt pavements are becoming so general in the large cities that the use of a non-slipping horse-shoe by mounted troops doing service therein, whether riot duty, patrolling, etc., or the less arduous duty of street parades, will contribute materially to the confidence and efficiency of the horse and his rider.

## THE QUESTION OF AN ARTILLERY RESERVE.

BY FIRST LIEUT. WM. E. BIRKHIMER, 3D U. S. ARTILLERY.

**I**T is proposed to treat this subject in its relations to an army of United States troops. Our military position is peculiar.

The national government has adopted no method of training all its citizens to the use of arms. The disposition of our people, their occupations, our geographical isolation from the great military nations, all give tone to our national policy, which is to devote our energies to civil and peaceful rather than to war-like pursuits.

Yet an experience now of upwards of 100 years has taught that we must, in some measure, cultivate that knowledge which will enable us to fit out and command armies, and to prepare our sea-coast for defense. As to the former, the military policy of our Government is not so nebulous as some people seem to think. It consists in the maintenance of a small regular army, wherein the number of officers is greatly in excess of actual need for purposes of command and of administration, in order that a highly trained and competent corps of surplus officers may ever be ready for assignment to other duties. When war intervenes, volunteers are called out to prosecute it in conjunction with either the old or augmented regulars. As a rule, in the higher grades, the whole army is officered from the regulars. It is believed that this policy will be perpetuated. It were easy, but unnecessary to assign reasons. It unites, apparently, the maximum of military efficiency combined with that minimum of military expense, which ever is a matter of solicitude with our people: and in this the will of the people is the supreme law. As a result of this peculiar organization of any large army which the United States will send into the field, it may follow that an artillery reserve might be found necessary with it when others might not have one. As the personnel of the contending forces might be brought into the field under wholly different principles as to recruitment, so, also, might it be true that, if greatest efficiency is to be attained, their details of organization would differ.

In the United States, authorities on the subject of an army artillery reserve are conflicting. In the work "Troops in Cam-

paign," issued by order of the President in 1892, it is enjoined that under ordinary circumstances, not to exceed three-fourths of the field artillery will be assigned to corps and divisions, the remainder being organized into brigades and constituting the reserve artillery of the army. We have heard it suggested that "reserve artillery" is wholly different from "artillery reserve"; but the distinction is without a perceptible difference; and it is held here, accordingly, that the prescriptions of "Troops in Campaign" go to the point of authorizing an artillery reserve, in an army of two or more corps, composed of at least one-fourth the total number of field-pieces.

On the other hand, the Light Artillery Drill Regulations, also approved by the President, recognize no such reserve. They enjoin the assignment of all the artillery to either divisions or corps, after the fashion generally in Europe subsequent to, and in some European armies before 1870. And in this connection it is interesting to notice that during the last stages of the War of the Rebellion the artillery reserve of the Army of Northern Virginia, under General Lee, was abolished, and the batteries distributed to corps and divisions.

So far, therefore, as mere prescription goes, we have, in our service, authority both for and against an artillery reserve. How stands the reason of the thing?

What is the use of an artillery reserve? This has differed in various armies. Napoleon used it as the last weapon, to be launched, as he could do it, upon the critical point of attack, with overwhelming effect. If others could use it as he did, it generally would be conceded to be an excellent thing despite any drawbacks that might attend it. But we do not expect Napoleons habitually to command United States armies. How, then, does the question present itself in an army under an ordinarily competent commander, loyally supported by his subordinates.

We have had one experience going directly to the elucidation of this point that we ought to study with care. When the Army of the Potomac was organized, it was given an artillery reserve composed of about one-third of the total number of guns. This, with various mutations of fortune, was maintained until the Wilderness campaign was begun in May, 1864. Then the reserve temporarily was broken up, the surplus guns sent to the rear, and the caissons attached to the batteries retained. The Wilderness campaign was fought without an army artillery reserve.

Yet, without specific orders, and from sheer force of circumstances, it was reorganized soon afterwards.

During its existence it furnished not only batteries for all the battles, but also a depot of supplies for guns distributed to troops. The reserve did not mean a great mass of field artillery kept back at some place in rear, away from the fighting, without any assigned function on the battle-field, and principally known to the army by its being in the way of marching columns. Very far from it. On the contrary, it was a special organization, capable of being used with great power by one who understood its properties, kept ready at the hand of the army commander to put into action when and wherever the phases of the battle demanded. It was the almost unfailing experience that every gun of the reserve went into the contest if at all prolonged. In the great battles, all its batteries went into the fight. They sometimes began it. This was conspicuously the case at Malvern Hill. And of its use there one of the ablest Confederate fighters said: "The battle, with all its melancholy results, proved that the Confederate infantry and Federal artillery, side by side on the same field, need fear no foe on earth."

But there was another use to which the artillery reserve was put that was scarcely less valuable, although less attractive and attended with less *éclat* than its fighting qualities. It furnished the means of re-supplying on the spot, and without delay, knocked to pieces and broken down batteries. For the first time corps commanders appreciated this fact after the reserve was broken up as mentioned, and it was one of the causes leading to its reëstablishment. Before that, these commanders had never given the subject of rehabilitating a broken-down battery or their exhausted caissons much thought: that matter had been attended to by others. But when their source of recuperation disappeared, they began to appreciate its value.

The reasons for breaking up the artillery reserve in May, 1864, as before mentioned, were perhaps manifold. The fighting was in a country where roads were scarce, and underbrush covered the face of nature with a veil almost impenetrable. The enemy was everywhere entrenched behind earthworks that were too strong for the field artillery of that day to destroy. It was absolutely necessary as much as possible to reduce transportation. The battles were death grapples of giant opponents, in the bushes, which never relaxed from start to finish—and extending over a



twelve-month. Then again, an artillery reserve, organized like that of the Army of the Potomac, and handled like that was, had not formed a distinct feature of those armies in the West commanded by General Grant. He in all probability never had his attention called in a particular manner to its necessity or utility as one of the essential parts of an army. Under all these circumstances, it is not perhaps to be wondered at that General Grant broke it up. The truth is that, until after the army crossed the James River, the character of the country almost forbade taking the reserve along; and after that event it again came into being, but principally for purposes of recuperating and supplying batteries attached to corps. So that in point of fact the mere circumstance that the artillery reserve was broken up for a while does not, of itself, operate, when properly understood, to the prejudice of the principle involved in assigning it a certain and understood place in the organization of armies. The terrain, in the opinion of the new army commander, rendered its use for a time problematical, and its dissolution, which proved to be but transient, advisable.

In his report dated October 31, 1864, General Hunt, Chief of Artillery, Army of the Potomac, spoke of the artillery reserve as follows: "Its records prove that on the field it has done its full share of the fighting, and borne its due proportion of the losses of the artillery, while it has rendered other and fully as important services. At many of our principal battles, notably at Malvern Hill and Antietam, its ammunition trains supplied the batteries of the divisions, many of which otherwise would have been rendered useless. Whenever from the character of the ground or from other circumstances, the ordinary amount of artillery attached to troops proved insufficient, it has supplied the deficiency. Its batteries, in all our great battles, have always gone into action at critical moments, and almost invariably every gun has been called for and employed. Especially was this the case at Malvern, Antietam, Fredericksburg and Gettysburg. It has also been of great value in another way. Batteries in the corps losing their efficiency either from the want of men or material, the incompetency of their officers or the casualties of battle, have been at once replaced from the reserve, thus keeping the army corps fully effective. I have considered this notice of the reserve artillery necessary under the circumstances in order to guard against the inferences which might be drawn from the order to break it up.

The inconveniences that have since been felt from want of it, the order to return the guns to the batteries, now being executed, and the fact that it has been found necessary to keep up the reality, without the proper organization of the reserve, in order to insure supplies of ammunition to the army and furnish a place for surplus, unattached and disabled batteries, has clearly vindicated the principle of the necessity of such an organization in a large army."

It is believed that there are stronger reasons in the United States for having an artillery reserve with any army, say of the size of the Army of the Potomac, than in some other services. It results from the constitution of our armies. From the necessity of the case it has always been true that officers who, until war broke out, were civilians, are commanding divisions and in some cases army corps. It practically is a most difficult thing to persuade these officers that a necessity exists for taking their artillery from them even temporarily, to concentrate it *en masse*, as a reserve is used. Of course it is easy enough for the army commander to order this, and it should be easy to enforce his orders. But, in an army officered like ours will be, largely of volunteers, whose political influence is great, however little or much may be their real military merit, the Commanding General may often hesitate to exercise authority that may be easily enforced, yet which gives rise to protests from subordinate commanders on the eve of or during battle. That is precisely what took place at Fredericksburg. Division commanders, when called on, vigorously demurred when it was proposed to borrow their artillery for even a short time to prepare for crossing the army over the river in the face of the enemy. They would indeed obey the order, so temporarily detaching their artillery, but would not be responsible for the consequences. That was the spirit manifested; that the language used. Now there is nothing more disquieting, we readily may suppose, to an army commander than to have his subordinates complaining of ill treatment when fighting is imminent. It readily is seen how anxious he would be to obviate such trouble in the future. An artillery reserve, promptly kept at hand would enable him to do this. And there is something to be said on the side of division commanders under such circumstances. They, it is to be presumed by careful training, bring up all their forces to the true fighting point. They practice them all together and as a body. They do this in order that their divisions,

as units, may acquit themselves with credit on the battle-field. It is truly discouraging from this point of view to be deprived of their artillery just at the time when they probably will most need it. No wonder then that our volunteer division commanders protest, when, in the act of taking place in line of battle, their batteries are taken from them. In an army like the German, and those of other Continental powers, where all the officers are experienced and disciplined commanders, it may prove easy thus to detach artillery from their divisions or corps. But in the nature of things the United States will never have one generally so officered. It is the part of wisdom to organize our armies to meet our own national situation. Let us, therefore, leave our volunteer or inexperienced subordinate generals in full possession of their divisions or other commands, and not organize our army in such manner that these subordinates will be deliberately disconcerted at the very time when their only thoughts should, where this is practicable, be directed solely to getting the most fighting out of their troops.

Consider the situation of affairs on the Union side at Gettysburg. The Commanding General was new to his position. The corps and division commanders were not, except in a very few cases, of his selection. So far from this being so, reasons exist for the belief that in many of them he had little confidence. Can it not be imagined that he regarded with supreme satisfaction the presence, directly at his command, of that superb artillery reserve of the army which, on that decisive field, put every gun into the fight. On the other hand, how different would have been his position had he to depend upon borrowing artillery at the critical periods of battle from division and corps commanders, each one of whom might deem himself as sustaining the brunt of the fight, and sent his guns grudgingly and with the half threat that he "would not be responsible for the consequences."

For the reasons given, and for others, it is believed that, in any large army of United States troops, an artillery reserve would be an essential feature of the organization even although in a more thoroughly disciplined one, as any government of Continental Europe, for instance, would send into the field, it might not be found necessary. This belief is predicted upon two assumed facts: First, that the army commander is competent, and justly appreciates the power of modern field artillery: second, that he will have a chief of artillery, who is fit for his place, and

who, among other duties, will have command of, or at least the direction and management of this reserve. It is believed that we reasonably can presume that both of these conditions will be fulfilled.

The situation of the Confederate army at Gettysburg may be cited as proof that it is possible to collect divisional and corps artillery for all purposes. There is no doubt but that General Lee did so collect his artillery for his grand cannonade immediately preceding Pickett's charge, and perhaps at other times during the battle. As to this, I will say, that no army ever came upon the field more fashioned to the hand of its commander than was the Confederate at that battle. It had just been reorganized, and the corps commanders selected by General Lee. There never was an army that went into a battle with greater confidence extending from the head to all the parts than his on that occasion. The Southern Confederacy, although ostensibly a republic, was in 1863, as complete a military despotism as the wit of man ever devised. The Army of Northern Virginia in great degree represented the power of the Confederate government, and, for all fighting purposes, General Lee held in his hand and alone wielded that power. No one will deny that this was creditable to the intelligence of that government: they were in a contest with a superior power, and were in it to win if they could; to do this they did not hesitate to vest the commander of their main army with almost if not quite absolute military authority. This rendered it easy, natural, and as a matter of course for General Lee to handle his troops as to him seemed best, and without even a suspicion of a question being raised by a subordinate as to either the legality or expediency, of his orders. They never at that time questioned his acts, however much defeat has since given them a predilection for doing it.

The difference in the predicaments of the two opposing commanders on that eventful field, which here has been glanced at, will explain the greater necessity of an artillery reserve to the one than to the other. And, all things considered, we feel justified in regarding the Union army at Gettysburg as the ideal American Army. Not but that it had weaknesses; and the newness of the Commanding General was one of these: but, take it all in all, weaknesses and elements of strength together, it was a representative United States Army in the highest practicable state of development.

We must not be too hasty in permitting the inference to arise:



that, because General Lee broke up his artillery reserve and assigned all batteries to army corps, therefore he preferred, other things being equal, not to have such a reserve. If we did this, we would make, from a professional point of view, a great mistake. In point of fact, just before June, 1863, his army had but two corps. During that month (on eve of Gettysburg) it was organized into three corps. To supply them all with artillery, the whole mass belonging to the army, reserve and corps alike, was divided up among the three army corps. This gave each something less than each of the old corps had.

There were doubtless other potent considerations leading to this action. Without doing the least injustice to the brave and devoted departed, it can with truth be said that the artillery reserve of the Army of Northern Virginia was not handled so well as that of its opponent. It never took so prominent a part or played so important a rôle as did the artillery reserve of the Army of the Potomac. No wonder, therefore, that corps commanders grew impatient to have it gotten out of the way. Had the chief of artillery of that army been a more active man, permeated with enthusiasm for his arm, perfectly conversant with its powers, and how these were best to be utilized, the record of the artillery in the Army of Northern Virginia might and probably would have been different.

Fortunately for the Union cause, and the success of its arms, every soldierly and professional qualification was illustrated in a conspicuous degree in the accomplished chief of artillery of the Army of the Potomac and commander of its artillery reserve. These personal characteristics will be found to account, in great degree, although not wholly, for the parts played by the artillery reserves in the opposing armies.

In truth, at this time (1897), the armies of Continental Europe are organizing heavy field artillery batteries for the express purpose for which Napoleon used his artillery reserve. A short time since each of the 20 German army corps had 8 of these batteries. Of these only a few were horsed last year. The other governments are moving in the same direction. The following are the characteristics of the ordnance so used in some armies:

		Piece.	Weight.	Wgt. shot (lbs.) shell.	Charge (lbs.)
Austria	—Gun . . . . .	4.72 in.	3,748	36.8	10.58
"	—Mortar . . . . .	4.72	....	....	....
Russia	—Mortar . . . . .	6.00	1,012	68.0	3.85
Germany	—Howitzer . . . . .	5.87	3,307	60.7	3.3

We may be pardoned for calling attention to the fact that in the armament of the Army of the Potomac were batteries of precisely these natures: and they moved with that army wherever it went. When McClellan landed on the Peninsula in 1862 he took 4.5 inch gun batteries, the piece weighing 3570 lbs., firing a solid shot weighing 35.5 lbs., and in fact, for its day, this gun was seemingly the counterpart of the Austrian gun above mentioned as now coming into use. And as to mortars, there were a large number carried along with General Grant's army in 1864 and 1865, for one of the express purposes for which European governments now propose to use them, namely, to drive an enemy out of a field-work where he is so intrenched that field-gun projectiles can not reach him. With regard, therefore, to the use of heavy pieces with a manœuvring army, it is a fact that Continental states are coming now to where we were thirty-five years ago. Yet there is a great difference in the way in which such pieces were and are utilized in the two cases. In Europe they have gone into the matter systematically. Our efforts were rather sporadic in their nature.

Not much has been written on this new feature of European field artillery: and it is asserted, with how much truth is not known, that measures are taken to keep the matter secret. However, what has been written is interesting from its bearing upon the question of an artillery reserve: for if any part of the artillery is purposely and by organization destined for and made to play that part, it is in fact an artillery reserve although it be not called such.

Upon this point a German military journal remarks that when the battle is sufficiently advanced to enable the forces in presence of one another to be estimated, then the moment has arrived to bring the heavy batteries into play, with a firm resolve to decide the issue. And it remarks that, thanks to the enormous effect of their projectiles, these heavier field-pieces will produce, both morally and physically, an effect which it would be impossible to obtain by other means. The object of the heavy batteries, it is observed, is to shake the enemy's infantry, upon the point where the Commander-in-chief has decided to break through.

Commenting upon this latest phase of the artillery question, Lieut.-Colonel Browne, late Royal Artillery, remarks: "If we wish to summarize the present idea, it may be said that what is recommended is the creation of an ideal artillery reserve, sufficiently light not to interfere with the manœuvring power necessary

for field armies, but at the same time powerful enough to provide the Commander-in-chief with a certain means of forcing on the decision of the combat, by producing effects hitherto unknown both in a material and moral point of view."

From all this it appears that just at the time when the practices in European armies had given foundation for the belief that, with them, army artillery reserves were a thing of the past, this feature of army organization appears in a new but nevertheless a certain substantial and unequivocal form. The manner in which it is proposed to use it clearly characterizes it, in the language of Lt.-Col. Browne, as an artillery reserve. It is to be used precisely as Napoleon employed his. Its characteristics are wholly those of such an organization. This, its nature, determines, then, what the organization is, and what it should be designated: but whether it be so designated or not cannot change the fact that in reality it is an artillery reserve. We are told that, the point for breaking through the enemy's line having been fixed upon, this new accessory is to be crowded to the front to overwhelm it by the superior power of the projectiles. When we hear this we may almost delude ourselves with the belief that we are reading Jomini's maxims as evolved from the practice of the great master in the art of war. The necessity for, and the theoretical use of the artillery reserve at the commencement and end of the nineteenth century appears, therefore, to be identical.

Our light artillery drill regulations assign the corps artillery a place well to the front during the march. It is preceded by nothing more than the leading brigade and divisional artillery of the leading division. Of course circumstances may change this; but that given is the normal position. Now, the theory underlying marches in presence of the enemy is, that troops will be arranged from front to rear in column in the order in which they will be brought into action. This position of the corps artillery presupposes, therefore, its early employment in the battle, where its position, assigned by the drill regulations, is either in the centre or on the inner flank of the corps.

It is possible that the artillery in many instances may be handled the more easily on the march, when thus broken up and distributed among corps. Indeed, the practice now advocated in some services, Germany among them, is to scatter the ordinary corps field artillery among the divisions. This would further subdivide it for marching, and might facilitate the latter. But it

would render the concentration of artillery masses the more difficult, and with us would perhaps make it impracticable. The veteran division commanders of Germany might promptly respond when the army commander called for their artillery. We have no reason from experience to think that our less disciplined volunteer officers would do the same. Our general, therefore, must keep this weapon in his own hand.

After having travelled over Europe General Grant remarked that no rules will apply to conditions of war so different as those which exist in Europe and America. "Compare," said he, "the invasion of France by the Germans with the invasion of the South. The Germans moved from town to town, every town being a base of supply. They had no bridges to build. They had no corduroy roads to make, and I question if a corduroy road was made in the whole campaign. I saw no reasons for one in my journeys through France. I saw the finest roads in the world. The difficulties of a campaign in an open country, generally a wilderness like America, especially as compared with a highly cultivated country like France, are incalculable." Nor is the face of nature, such as here is so clearly described, more unlike than the methods of raising troops and officering them in the two hemispheres. Neither does our divergence of military methods stop here. They extend in their diversity to nearly every incident in the conduct of the war. In Europe certain military maxims are observed, and, so far as practicable, war with them is reduced to a science. It is characterized by many rules that are necessary in all countries, notably their recognition of new appliances, and indefatigable industry not only in developing, but if of value, in practically applying them. While this is so, it is necessary for us, in adopting European ideas, carefully to consider whether these, the precepts and practices of military nations, are really applicable to the army of a conspicuously non-military nation like the United States.

Aside from certain considerations of general applicability in all civilized warfare, the circumstances of the particular case when it arises will determine whether we should follow, and if at all how closely, the European methods. To this rule the matter of an Army Artillery Reserve is no exception. Even if European armies could dispense with them, which in fact they do not seem to be able to do, it by no means follows that we can do likewise. And in truth, it does not seem probable that we ever wisely can



dispense with it. Our army commander, if competent for his duties, and capable of fighting the arms to advantage, will need an artillery reserve, always at his bidding, to place in the action wherever the exigencies of the fight demand, in order to obviate those difficulties that may attend his position resulting from the imperfectly trained army with which alone the Republic insists on supplying its generals.

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## THE SANITARY SERGEANT.

BY MAJOR C. L. HEIZMAN, SURGEON U. S. A.

AT this day it may be said to be a truism that, whatever relative value is given to the military virtues, they are all dependent for their effectiveness on a healthy body and a sound mind.

Military hygiene, as a means to the end, has grown very much in the esteem of great leaders and writers since the period when Xenophon recorded the advice of Cambyses to Cyrus, and, along with recognition of its importance, it has developed into a science that has added to its purposes, is extending its field and is ever inventing new measures toward perfecting the soldier and his surroundings. Prior to the Persian king's recommendation regarding the selection of sites for camps, the Egyptians and Hebrews practiced police of grounds, disposal of offal and excrement, gymnastic exercises, as wrestling, leaping, running, cudgeling, and fixed dietetics. The physical education of the Spartan soldier is proverbial, and to well ordered bodily training, attention to food, clothing, and camps, and regulated bathing was due undoubtedly the remarkable success of the ancient Roman armies in enduring marches through the most varying climates and residence in the most insalubrious localities without suffering much from diseases that have destroyed modern armies. As far as we know, military officers exclusively had charge of these matters, it being surmised that it pertained to the prefect of the camp among the Romans until the time of Vegetius, fourth century, when it is certain that the legionary tribunes under the presidency of the prefect formed a sanitary council, the duties, that were not strictly military, of physicians being confined to the

treatment of diseases and wounds. This author is the first of the ancient, whose works have been preserved, who treats minutely of military hygiene, ten chapters of one book and two of another being devoted to the subject. In these are discussed the nationality, nativity, age, height, previous trade or profession, and physical character of recruits, mental and physical qualifications required before the *stigmata*, or soldiers' marks, were permitted; marching, running, and swimming drills, thrusting and exercise of arms and precepts for keeping healthy according to places, times, and kinds of water. Altogether it appears that the principal object of hygiene through antiquity was to cultivate vigor of body and, only indirectly, to prevent disease. This idea prevailed to such an extent that, as Cicero expresses it, the very name of army,—*exercitus*,—was derived from the labors required to make of a sound young recruit a sturdy old soldier.

In the ninth century the Emperor Leo (*Institutiones Militares*) enumerated hygienic precautions necessary for the well-being of an army. It was for the general to contend against idleness, intemperance, luxury, desire of gain, and superstitious belief in auguries and divinations among the soldiers; for the military physicians, against diseases caused by heat, cold, fatigue, change of water, unhealthy camps, inclemency of climate, and bad nourishment. Judging from the ravages of epidemics in the middle ages it may be concluded, that both duties fell into disuse. Nevertheless, medical writers, principally Arab, began, on this account and because of the ephemeral character of armies, as large bodies, not allowing systematic physical training, to give attention to the prevention of camp diseases, and thenceforward to the nineteenth century this purpose predominated.

In France, in the sixteenth century, André de Bourdeille, "Maximes et Advis du Maniement de la Guerre," states that it was the duty of the *Mareschal-de-Camp* to look after the health of the army, to keep the camp clean, to examine the water supply, to see that refuse was burnt, the actual duty being under the control of the *Prevosts*, to care for the sick and remove them to hospitals which he was to establish in neighboring towns. This official, an evident legacy from the ancient Roman organization, lasted, with ill-defined command, until 1678. The sanitary condition of the soldier was much ameliorated in the seventeenth century by gradual increase in number of commissaires of war, by the elevation of character and responsibility of the *Mestres-*

*de-Camp* and captains, regimental officers, and by the establishment of inspectors, upon all of whom were conferred different and more exact powers toward that end as well as for the improvement of discipline. Though Turenne regarded the health of the soldier as a precious boon, in his time physicians were rarely called upon for advice. A few, however, who were attached to the persons of generals, made observations of their own accord which they published. In the eighteenth century regimental autonomy was somewhat diminished, but colonels and quartermasters had still everything of consequence to do with sanitation. Physicians, distinct from surgeons, were now regularly assigned as officers to corps, as few as one to ten thousand men, and to some of them we owe writings, that will be classical for all time, on military hygiene still occupied for the most part with diseases and their prevention. Toward the end of the century army regulations provided for certain sanitary measures, and an eminent medical authority, Laveran, says of this period that the common sense of the generals and the intelligence of the physicians made up for the deficiency of the regulations. But all generals were not Earls of Stair and Klebers, nor all army physicians, Pringles and Desgenettes. Since Napoleon, in 1797, remarked that health was indispensable for war, and could be replaced by nothing, the evolution of the science, combining measures for enlisting sound men, for their physical and mental education and for the prevention not only of epidemics but of all diseases that render them ineffective, has made rapid progress. The system now in force, the result of the intervention of physicians and surgeons, to whom has been given official status, and who have been effectually supported by military men of broad and sympathetic mind, is nearly the same in all armies of civilized nations as in that of the United States.

First, there is the soldier, for the hygiene of the individual, compelled by regulations and orders to observe well-defined precepts and subject to routine inspections for their fulfillment; next, the squad in charge of a chief, a non-commissioned officer, who is responsible for the personal cleanliness of each member, for the police of the habitation, furniture, arms, equipment and of the clothing of the squad; then, the officer commanding the company, who is directed to inspect all of these daily, who has especial care of the preparation of food, and is the real effective power for the accomplishment of the obligations prescribed

by regulations and of all extraordinary measures ordered by the commanding officer of the garrison, regiment, etc., who, as a rule, acts by the advice or on the recommendation of the medical officers. These last, having supervisory functions, are required to be thoroughly conversant with all the details, technical and practical, of the science, the laws of which appear to be so simple and easy. A fair knowledge of the subject is imparted to all officers in the regular army some time in their career at the officers' schools. Many, the interests of their commands at heart, pursue further study of it. In the French army besides lectures to officers delivered by the senior surgeons, lessons in elementary hygiene are provided for non-commissioned officers to be given by the junior surgeons.

The whole plan is admirable and a great advance over that in use during the last century, which often degenerated into "pipe-clay," but it has its faults, here briefly stated.

1. Supposing all officers, military and medical to have a clear understanding of sanitation, the enforcement of measures of regulations or of occasional orders is apt to become, like drill, a perfunctory duty, except in the presence of epidemics; of others, acknowledged to be beneficial, to be desultory or neglected.

The non-commissioned officers, who are in constant contact with the men, however intelligent, are not instructed at all and are deprived, in consequence, of methodical, uniform and properly guided habits of observation.

2. In very many matters, outside of the customary inspections, officers have to depend on the voluntary testimony of soldiers concerning evils. This is often withheld through indifference, is prompted by ignorance and prejudice, or is conflicting or interested, and, hence, a small error may become in time a grievous fault or even a public danger before it is reported.

3. Though all rules applying to the mass of men may be apparently obeyed, the personal element may nullify their effect. An example will elucidate this point. A barrack floor or wall may be pronounced clean after inspection and yet be soiled and made more dangerous to health by a little spittle than by dirt that would be more in evidence. It is more important, according to modern well-grounded medical opinion, that the habit of promiscuous expectoration be corrected than that the floors be mopped daily. Dislike to restrain the liberty of the individual, unless his actions are in flagrant interference with the health and



comfort of his neighbors, or unless it has become necessary to do so by reason of an epidemic, is universal in both civil and military life. By the German regulations, as by the French, the men are enjoined to cultivate a knowledge of such matters. Yet teaching and example alone are not efficacious among men differently impressionable, more or less governed by habits contracted in childhood, or by influences operating before enlistment, or possessed of inherited passions in various degrees. Now the soldier is always in a position to obey orders whether for his own or for the public good. To direct him there is need of a superior officer familiar with hygienic precautions and procedures, understanding their purpose or theory, of an observant mind, and, more than all, living with the men and thereby intimately acquainted with the ins and outs of their lives.

The remedy, therefore, suggested is a company non-commissioned officer, educated in the elementary principles of sanitation, to whom are attributed powers of inspection and execution, to cover the whole field of company hygiene.

In every company, troop, and battery one of the most intelligent sergeants, preferably a professional soldier, of cleanly and exemplary habits, should be selected and appointed "sanitary sergeant," who will not be relieved from any duties by reason of such selection.

A first sergeant may be designated, but another would be better, because modern advances have made sanitary matters too numerous and important for the first sergeant to superintend besides performing his military duties, which have also multiplied in recent years.

He should have direct supervision and charge of everything relating to the sanitary condition of the company, and his orders should be obeyed as coming from the captain, whose agent he will be in all such affairs.

His duties will be two-fold, to inspect and report infractions of hygienic laws to the officer commanding the company, who will decide upon further reference to the surgeon, and, to enforce the orders for their remedy.

He should have nothing to do with medical and surgical events, emergencies, other than what is required by present orders for all soldiers, nor should he wear the brassard at any time.

It would be well, however, that company bearers be selected

one from each squad, and these together with the non-commissioned officers in charge of the squads, should be, for military purposes, under his orders, constituting "sanitary squads." He should be responsible for the care of the company litters and appurtenances.

He should keep a tabulated book to contain the vaccination record of every man and past history in regard to all contagious and infectious diseases before and after entering the service, information to be furnished by the surgeons, and such other data affecting health as may be necessary; also, a bath register of body ablutions of every man, and a record of physical measurements after stated periods of gymnastic practice.

He should have charge of the effects of all deceased soldiers and make disposition of them according to the regulations after authority has been given by the surgeon, in order to carry out a measure necessary to prevent spread of contagious and infectious diseases, one not now in force because this source of disease has not been generally recognized.

A manual containing the essential principles of military hygiene and description of their application should be issued to him. He should, also, attend lectures in first aid and a more extended course of elementary hygiene by the surgeon than the present should be provided for him and the company bearers.

Consideration of the following particulars will demonstrate the advantage of this institution, by means of which more reliable reports will reach the commanding officers, because free from prejudice, based on information obtained not by leading questions, but by actual observation in barracks and field, such observations being directed in a scientific manner by reason of training, and by overhearing the comments of comrades.

*Care of Person* : Immoral and filthy habits, bathing of body, care of hair, physical exercise, over fatigue, preventive measures against sun and heat, against frost-bite, consumption of unripe fruit, especially on the march, malodorous persons who are not aware of their condition and are not at fault, loathsome chronic skin affections, malingering, abuse of quack medicines.

*Clothing and Equipment* : Cleaning, laundrying, airing, suppression of vermin, change of garments according to incident as well as at regular intervals, of bed linen, extermination of bed bugs.

*Marches* : Excessive use of water, defective shoes and footwear.

*Venereal Diseases:* Many cases do not reach the surgeon; more would be noticed or suspected by a sanitary sergeant.

*Alcoholism:* Such an officer would make more truthful reports of this and other vices than are secured now mostly from the individuals concerned.

A sum of opinions that are of any value would be obtained by the proper officers in regard to

*Clothing and Equipment:* Its quantity, quality and fit or defects that interfere with free and healthy locomotion.

The possession of precise notions of all of these and the remaining subjects by those who both transmit commands and order on occasion would save much trouble and be of immense benefit.

*Food:* The captain could delegate to the sergeant the whole or partial management of the ration. Complaint should be made to him first, and, after investigation, he should present them to the captain, who, if he sees fit, may forward to the surgeon or to the commanding officer having authority to apply remedies.

*Habitations:* Entire police of company barracks, including water-closets and bath-rooms, stables and of grounds, to be the sergeant's especial charge, and defects or breaks in plumbing, ventilation, heating and lighting to be reported to and by him.

*Camps:* Proper ditching and draining of the whole ground of that covered by tents, orderly establishment of latrines, regulations for bedding, disposal of kitchen and other refuse, supply of drinking water, cleanliness of cooking and other utensils.

*Extraordinary Measures:* The direct charge of burial parties after a battle and of the sanitation of the field.

During *epidemics*, a sanitary sergeant would be invaluable to the surgeons, reporting to them any neglect or precautions recommended, suspicious cases, etc. The captain would have a more responsible and better trained non-commissioned officer than one selected for the occasion, upon whom to depend for the *immediate* isolation, disinfection, or destruction of personal clothing and bedding, according to the decision of the surgeons.

## THE METHODS OF INFANTRY AMMUNITION SUPPLY IN FOREIGN ARMIES.

BY CAPTAIN C. S. ROBERTS, 17TH U. S. INFANTRY.

**A**N apology for writing on the subject which I have chosen may be due to you, since what I may have to say can hardly be unknown to any military student. The matter has been fully treated by Major Mayne in his "Infantry-fire Tactics," incidentally by Lieutenant Batchelor and other writers. The latest information I have been able to obtain I have found in the "*Bulletine de la Presse et de Bibliographie Militaire*, fortnightly magazine published in Brussels. To all these sources of information I am indebted.

It would certainly be more beneficial, and possibly more interesting, if I might describe the methods adopted by our own military authorities to supply our own soldiers, but unfortunately, if such a system has been devised, I am not aware of the fact. Certain plans appear to be in process of formation but it is yet too early to expect any definite results. The maxim "In time of peace, prepare for war," applies with greater force to all other nations and peoples than our own; indeed, it is not an exaggeration to say that in time of peace in our country all the efforts, with a few conspicuous exceptions, of our press and public men, seem to be directed to a thorough eradication of military spirit.

For these reasons, it becomes necessary for an officer interested in his profession to turn to the regulations in force in foreign armies for, practically, all information with reference to the equipment and supply of troops in the presence of the enemy.

With these remarks by way of introduction, I return to my subject. The difficulties of replenishing the supply of ammunition have become greater and greater in the ratio in which weapons have improved. The rapidity of fire being one of the essential factors of success upon the field of battle, the different powers have been forced to increase it to the greatest possible limit. After having replaced muzzle-loaders by breech-loaders, they have sought to further augment the rapidity of fire by the



use of magazines which are re-filled by cartridges in packages. We must therefore expect in future battles an enormous increase in the expenditure of ammunition. Whenever infantry has expended its ammunition, it loses the most powerful of its means of action. It follows that the supply, or constant supply, of troops with ammunition, during and after action, constitutes one of the most important duties of officers of every grade.

To the end that troops may be at all times in a condition to accept and sustain an obstinate battle, it is indispensable :—1st, that they carry upon their persons a large supply of ammunition, and, 2d, that the replacing of this supply be made without hitch or hindrance.

The supply for battle consists of the cartridges carried by the men and the reserve supply in the wagons which follow in close touch with the troops. In order to insure the uninterrupted replacing of ammunition, it is necessary :—1st, that the troops shall be followed by movable, reserve ammunition trains; 2d, that there shall always be a certain quantity of reserve ammunition at the point which serves as the base of operations, and, 3d, that the communication between the troops and the base shall be absolutely assured.

The means to this end employed by different armies is instructive and interesting, as evidencing the conditions, so far as preparation is concerned, which are considered absolutely necessary.

The ammunition habitually carried by the private soldier is as follows :

In the German army, 150 rounds per man.

In the French army, 120 rounds per man.

In the Austrian army, 100 rounds per man.

In the Belgian army, 180 rounds per man.

In addition to this allowance, the following amounts are carried in the company, battalion or regimental wagons, and the various reserve ammunition trains :

*In the French army.*

In the company ammunition wagons, 65 per man.

In the division ammunition sections, 69 per man.

In the corps ammunition trains, 48 per man.

In the army train or grand park, 110 per man.

*In the German army.*

In the company ammunition wagons, 50 per man.

In the corps ammunition column, 80 per man.

In the army park, 20 per man.

*In the Austrian army.*

In the regimental ammunition wagons, 42 per man.

In the division ammunition train, 57 per man.

In the corps ammunition train, 18 per man.

In the army ammunition train, 26 per man.

At the army depot, 25 per man.

*In the Belgian army.*

In the company baggage wagon, 14 per man.

In the battalion ammunition wagon and pack horses, 31 per man.

In the division ammunition train, 90 per man.

The supply of ammunition first available is that carried in the vehicles, by whatever name called, which follow next the troops on the march. It is laid down as a principle that a battalion should never go into action without its ammunition wagons. These wagons, or carts, differ somewhat in details of construction; the French and Austrian being similar to artillery caissons, consisting of a fore and hind part connected by a trail, carrying three movable chests in which ammunition is packed so as to be readily distributed. For more particular description, reference is made to Major Mayne's "Fire Tactics." In the German army the first available supply is carried in two-horse company wagons, in which ammunition is so packed as to be immediately available.

The drivers of the company or battalion ammunition wagons are in all armies detailed from the men of the battalions to which they belong, as are also the men who attend to the loading and distribution of the ammunition. The non-commissioned officers in charge are specially selected, and all have a thorough preliminary training in all details pertaining to their duties. As showing the scope of this instruction: The non-commissioned officers and men are instructed in the nearest field artillery batteries, with which they remain for four weeks, and learn to equip, load and conduct ammunition wagons, and specially all that relates to the replacing and distribution of ammunition during and after a fight; the drivers and orderlies are attached for five months, either to the cavalry or field artillery batteries nearest their station, and are carefully instructed in every detail of their duties.

The reserve ammunition (and by this I mean all ammunition

except that carried in company or battalion wagons) is transported in regularly organized ammunition trains. These trains, by whatever terms designated, are practically the same in all armies. In the German service to each corps there are ten ammunition columns, four containing infantry ammunition. Each infantry column has twenty-one wagons of infantry ammunition. The ammunition columns are divided into two echelons, each containing two infantry ammunition columns, one for each division. The 1st echelon marches near the troops, and its supply of ammunition is at once available; it carries forty cartridges per man. The 2d echelon marches with the train in rear, and carries the same amount of ammunition; it is to replenish the supply of the 1st echelon, and is in turn supplied by the army ammunition columns or from fixed depots.

In the French army the 1st echelon is divided into six sections. The first two sections carry infantry ammunition, one section for each infantry division, and contain 69 cartridges per man. The organization is in the charge of the artillery.

Each section (infantry) consists of

32 4-horse infantry ammunition wagons.

1 4-horse forage wagon.

1 6-horse forage wagon.

3 2 horse provision wagons.

1 4 horse battery wagon.

The personnel of each section is as follows:

1 captain, 2 lieutenants, 1 quartermaster, 6 assistant quartermasters, 1 chief artificer, 1 quartermaster sergeant, 6 foremen, 1 farrier with 2 assistants, 2 blacksmiths, 2 carpenters, 6 pyrotechnists, 2 harness-makers or saddlers, 2 trumpeters, and about 150 teamsters.

The 2d echelon is divided into four sections. Each of the first three carry 15 wagons of infantry ammunition, a total of 48 cartridges per man, and is for the replenishing of the supplies of the 1st echelon. The second echelon draws its supplies from the "army park," which at all times is supposed to have available 110 rounds per man of infantry ammunition. It is composed of five echelons similar to the second, and is under the command of a colonel of the supply department.

A total for the two echelons, over 400 wagons and 2600 men and officers for each corps. (The army park, 900 wagons and 7560 men and officers.)

As illustrating the thoroughness of preparation, even among the smaller states of Europe, I will now refer to the regulations in force in the Belgian army, the peace establishment of which consists of 34,000 infantry. As has been noticed, each infantry soldier carries 180 cartridges (weight 13 lbs.). Each company war strength 250, has a baggage wagon which carries 3360 cartridges, or 13.44 per man, and, in addition, each battalion is followed by a wagon containing 26,880 cartridges, and two pack horses each carrying 2100 cartridges, a total for each battalion of 31,080 cartridges. Each division has two ammunition trains, one of 21 wagons, and the other 20 wagons, of infantry ammunition, each wagon containing 26,880 cartridges.

During the march the battalion ammunition wagon follows immediately behind its battalion, and the company with the baggage train. The ammunition trains keep close touch with the troops. On the march they are part of the train *du combat*, and follow the ambulance train, halting outside the danger zone. When battle is imminent, as much ammunition as can be carried is issued to the men. This is taken from the supply carried in the company and battalion wagons. While awaiting the arrival of the division ammunition team, it is permitted, if necessary, to issue the ammunition belonging to troops not engaged (from their battalion wagons). At the beginning of a battle, the battalion wagon, which has been re-supplied if previously its supply had been distributed, and the pack horses, take post under cover in rear of their battalion; if possible, within 500 metres of the firing-line. When firing begins, the pack horses are brought as near as possible to this line, and continue to move backwards and forwards from the line to the wagon. If the terrain permits, the wagon is driven close up to the line of fire. A number of men are detailed from each company to take cartridges from the chests carried by the pack horses, or in certain cases from the ammunition wagon, and distribute them along the line. The cartridges of the dead and wounded are distributed among the nearest combatants, or piled in bunches near the line. When the supply in the wagon is exhausted, it is immediately refilled from the advanced wagons of the division train, and returns to its position in rear of its own battalion.

The German Regulations prescribe that when a serious engagement is expected the senior officer with the troops orders the division ammunition trains to advance to proximity with the



troops, and a portion of this train is brought to the field of battle. The troops engaged are immediately notified of the location of the train, which is required to immediately fill all demands. When infantry are deployed for action, the cartridges carried in the company wagons are distributed among the men. They are carried in their haversacks, trousers, and coat-pockets, etc. These wagons are immediately re-filled from the division train, and return to the battle field *terrain du combat*, taking position under cover, in rear of and a short distance from the firing-line. In urgent cases, they are to be driven up to the firing-line, without regard to danger. The cartridges of the troops engaged are replenished, so far as possible, by reinforcements as they arrive on the line. If it is necessary to send an extra supply to the firing-line, men are detailed from the reserves for this purpose, the men so detailed remaining with the firing-line. This is the universal rule—troops are never relieved at the front because their cartridges are exhausted. It is prescribed in regulations that the cartridges of the dead and wounded shall be gathered and distributed. Officers as well as men are expected to take advantage of all opportunities to replenish their supply. It is not necessary to await orders. Not only should the men have the regulation allowance, but it is required that they shall have as much as it is possible for them to carry.

If at the beginning of an engagement the troops are on the defensive, especially when in a prepared position, there should be large supplies distributed along the lines, in boxes.

It should be noted that ammunition for distribution during battle is in packets which fit the rifle or magazine and can be instantly attached. These packets before being placed in the ammunition chests are packed in bundles wrapped in canvas, each containing 40 packets, or 200 cartridges. Attached to the bundles are strong loops, enabling them to be readily carried by the men charged with the duty of distribution.

It seems unnecessary to pursue this inquiry further, and I will only remark that the methods in other European armies are similar to those I have endeavored to describe. It may also be added that the whole subject of ammunition supply is carefully taught in connection with the closing exercises in battle shooting, and carried into actual practice in the annual manœuvres.

It is to be hoped that the importance of this matter may be so impressed upon Congress by our military authorities that

some action may be taken with reference to the organization of ammunition trains, and indeed a complete train service, that war may not find us entirely unprepared in this most essential feature of military organization.

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## A PROPOSED SCHEME FOR SECURING UNIFORM EXAMINATIONS FOR THE BATTERY COMPETITION.

BY FIRST LIEUT. E. A. MILLAR, 3D U. S. ARTILLERY.

THE "battery competition" prescribed by paragraph IV of G. O. No. 41, A. G. O., Sept. 4, 1896, is "of the nature of a competitive examination conducted by the board under such rules as it may deem best for the attainment of the object of the competition, which, however, must be thoroughly practical in character." "The object of the competition is to determine in *each battery* the classification of gunners and gunnery specialists by their absolute and relative excellence in apprehending and mastering the prescribed instruction."

When the examinations are finished the competitors are to be classified as 1st, 2d or 3d class gunners and gunnery specialists, and it has been the custom to publish in orders their names, classification and averages. Under existing circumstances the published averages are relative only in each battery but do not show the comparative excellence of the competitors of other batteries or regiments because the examinations and standards of marking are probably very different. The only instructions in regard to the examination are that it shall include the subjects laid down in the schedule of "minimum qualifications" and be practical in its character. The ideas as to what are, or are not, practical questions will cause differences in the examination as held by each board.

As this has been made a competition would it not be desirable to have the published averages show the relative standing of all the competitors in the subjects of the examination?

The object of this paper is to show how this may be approximately accomplished by means of a prescribed examination on subjects of instruction that can be given with the equipment which has been furnished all artillery posts.

The instruction should cover all the opportunities and facilities of the posts where the batteries may be stationed, but the

competition should include only those subjects in which all the competitors have been instructed. Credit should be given for excellence in all subjects of instruction which are not included in the competition ; this might be done by stating after the competitors' names, in a column of remarks, the additional subjects in which they are proficient.

The questions for the prescribed examination should be published in time to allow for thorough instruction and should be prepared by a board of officers convened preferably at the Artillery School where there are representatives from the different regiments.

The list of questions should be revised from year to year in accordance with practical suggestions made in the reports of the examining boards and be made to conform to the various changes in facilities of instruction. For the purposes of this examination and for general instruction a uniform and detailed system of vessel-tracking should be established which is applicable to the observing instruments and means of communication used at the different posts. A complete list of authorized gunnery terms and definitions is desirable, applicable not only to range table conditions where the piece and target are considered on the same level, but also to the usual conditions where the piece is at varying heights above the target.

With a prescribed examination the averages reported by the different boards would be approximately relative, the officers in charge of the instruction would have a guide on which to base and devise the various methods of imparting it suited to the needs of the competitors, and the competitors, having been drilled in the questions, should understand them.

The following questions are submitted as examples of what might be prescribed for an examination on the subjects included in the schedule of "minimum qualifications" for gunners and gunnery specialists.

Numbers, angles, distances and letters of observing stations are indicated only. These are to be designated by the examining board, and those referring to base lines should conform to the conditions existing at the place where the examination is held. The number after each question is its value. The maximum value of questions to be asked a competitor under each heading is the number given in the column of maximum figure of merit of the schedules.

## GUNNER'S EXAMINATION.

1. *Use of Angle Measuring Instruments.*—A. Azimuth Circle. Prepare the instrument for use at — to take angles from the base line —. (Value 5.)

The instrument being in adjustment, the gun angle of — is what? (1.)

Considering — as the splash of the shot, what is the shot angle? (1.)

Considering — as the target, what is the target angle? (1.)

Considering the line of zeros to have been out — minutes, correct the angle. (1.) (Note. Form 31 d.)

The station at the other end of the base line is not visible from the instrument at —, but the angle from the base line to the visible signal at — is — degrees — minutes, adjust for taking angles from the base line. (5.)

The azimuth of the base line looking from — is — degrees — minutes. Adjust the instrument for taking azimuths. (5.)

The instrument being in adjustment, take the azimuths of —, —. (1 each.)

Take angles to moving object —. Ready — two — take —. Ready — two — take —. Ready — two — take. (Maximum value for interval of 20 seconds between "takes" exclusive of the time taken by the examiner for verification.) (10.)

B. Transit. Prepare the instrument for taking angular deviations in rear of the — piece, considering — as the target at — yds. (5.)

Considering — as the splash of the shot, what is the deviation? (1.)

The deviation is — minutes R (or L), what is the deviation in yds? (1.)

Target — yds., deviation —, minutes —? (1.)

Prepare the instrument for taking deviations in points. (5.)

Considering — as the target, set the micrometer for — points. (1.)

C. Circular Protractor. Place the protractor in the proper position at — for laying off angles from the base line —. (5.)

Draw a line through —, making with the line — an angle of — degrees — minutes. (1.)

The azimuth of the line— is — degrees — minutes. Set the protractor at — for laying off azimuths. (5.)



Draw lines through — whose azimuths are —, —, and —. (1 each.)

D. Sights. Set the sight for the — piece at — degrees — minutes. (1.)

Gunner's quadrant (old style) for use with the long arm across the face of the piece. Set for — degrees — minutes. (1.)

For use with long arm in the bore, set for — degrees — minutes. (1.)

New style. Set and show how the instrument would be placed on the piece for giving a quadrant angle of — degrees — minutes. (1.)

2. *Use of Plotting Board.*—The angles being measured from the base line —, adjust the protractors. (5.) The gun angles of the — piece are; from —, — degrees — minutes and from —, — degrees — minutes.

The target angles are: from —, — degrees — minutes and from —, — degrees — minutes. Give the distance from piece to target. (1.)

Taking the above as the target, the shot angles are; from —, — degrees — minutes and from —, — degrees — minutes. Give the deviations. (1.)

The azimuth of the base line looking from — to — is — degrees — minutes the length of the base line is — yds. adjust the protractors for laying of azimuths. (5.)

The azimuth of the — piece from — is — degrees — minutes and from — is — degrees — minutes. The azimuth of the target from — is — degrees — minutes and from — is — degrees — minutes. Give the distance of piece to target. (1.)

Shot No. 1. Azimuth from —, — degrees — minutes. From —, — degrees — minutes. Give the deviations. (1.)

Locate a target on the board at — yds. from a piece at — and in a convenient position in the field of fire. Determine the azimuth of this target from the piece and observing stations — and —. (2.)

The angles to the first position of a moving target from — is — degrees — minutes and from — is — degrees — minutes. Second position from — is — degrees — minutes and from — is — degrees — minutes. Third position from — is — degrees — minutes and from — is — degrees — minutes. The intervals between the observations being 20 seconds, plot the probable position of the target at — minutes from the first observation and

determine the range and azimuth of this position from a piece at—. (10.)

3. *Service of the Piece*.—"The examination may be oral at the gun or the competitor may be required to drill a gun detachment in the service of the piece."

The examination should be preferably only at the piece the service of which has been assigned to the battery to which the competitor belongs.

Post the detachment at the piece. (2.5.)

Give the names, uses and positions of the implements. (2.5.)

Distribute the equipments. (2.5.)

Give the commands and explain the duties of No. — in —. (5.)

How and by which cannoneers is the ammunition brought up? (5.)

Give the names and point out the parts mentioned in the service of the piece. (5.)

State the kind of piece, calibre, kind of powder, weight of charge and I. V. under standard conditions. (5.)

What precautions can be taken in preparing the ammunition and in the loading to secure uniform densities of loading? (5.)

What kinds of projectiles are used with the piece? What are their weights? (2.5.)

What kinds of fuses are used? Describe their action. If time fuse set for — seconds. (5.)

Prepare the plug for taking pressures. Having the table of pressures and the calipers find the pressures corresponding to the cylinder—. (5.)

4, 5, 6, 7. *Judging Distances, Speed, etc.*—The competitors are to be assembled at the piece to the service of which they have been assigned and are given a pencil and card, of the form which follows, on which they write their place, date, name and rank. The examiner calls out Distance to — stationary object.

No. 1 — take. Distance to stationary object—No. 2 — take etc. (2.5.)

Distance to — moving object No. 1. Ready — two — take.

Distance to — moving object No. 2. Ready — two take, etc. (2.5.)

Speed of — No. 1. Ready — two — take.

Speed of — No. 2. Ready — two — take, etc. (2.5.)

Velocity of wind — take. (2.5.)

The objects under headings 4, 5 and 6 should, as far as practicable, be in or near the field of fire of the piece.

As each of the above is called out the competitors write in the proper places their estimates of what is required. Under 4 estimates should be made on the regular harbor buoys or other marks and also on the tug or barge which has been directed by signal to stop in positions in the field of fire of the piece. Under 5 and 6 estimates may be made while the tug is moving to the designated positions or advantage may be taken of any passing vessel.

In order to determine the correctness of these estimates the examiner's directions to the competitors are simultaneously communicated to the range-finding party which determines instrumentally the required data.

GUNNER'S EXAMINATION, 4, 5, 6 and 7:

Fort —————

———— —, 189—.

———— Battery —, — Arty.

Distance to stationary object, No. 3. ————— yds.

No. 1. ————— yds. Speed of —————

No. 2. ————— yds. No. 1. ————— miles per hour.

No. 3. ————— yds. No. 2. ————— miles per hour.

No. 4. ————— yds. No. 3. ————— miles per hour.

No. 5. ————— yds. Velocity of wind.

Distance to moving object No. 1. ————— miles per hour.

No. 1. ————— yds. No. 2. ————— miles per hour.

No. 2. ————— yds. No. 3. ————— miles per hour.

8. *Laying Guns.*—Lay the piece in accordance with the following:

Target —, elevation —, allowance — (5.)

Target —, elevation —, and a total allowance corresponding to, allowance for wind — points —, drift — points, and for movement of target during the time of flight — points — (5.)

Quadrant angle — degrees — minutes, azimuth — degrees — minutes (5.)

Quadrant angle — degrees — minutes, azimuth of predicted position of target in — minutes — degrees — minutes, allowance for wind — minutes, for drift — minutes, time of flight — sec-

onds. Lay the piece and give the command fire at the proper time (10.)

As this is considered the most important part of the examination several examples of the foregoing problems should be given each competitor.

9. *Use of Range Tables.*—The examination under this heading is restricted to “only such simple problems as are likely to come within the province of a gunner.”

It would be desirable to have more definite instructions in this section as other paragraphs of the order prescribe that at target practice the calculation shall be made by the officer in charge of the gun while the duty of the gunner is to adjust the sight and sight the gun.

The following are submitted as simple problems in distinction to the more difficult ones to be given under heading (d) of the gunnery specialist's examination. The terms used are from Mackinlay's “Gunnery.”

1. Angle of elevation=angle between line of fire and line of sight.

2. Quadrant angle=angle between line of fire and horizontal.

1=2 when target and piece are on same level.

3. Angle of projection=angle between line of sight and line of departure.

4. Angle of departure=angle between line of departure and horizontal.

3=4 when target and piece are on same level.

Angle of sight=angle between line of sight and horizontal. (Also by Capt. Bruff, p. 347 “Text-book of Ordnance and Gunnery.”

Angle of projection — jump=angle of elevation.

Angle of departure — jump=quadrant angle.

When target is below piece quadrant angle=angle of elevation — angle of sight. (For practical purposes within usual existing conditions.)

Distance to target — yds. 1st shot with angle of elevation of — degrees — minutes went — yds., 2d shot with angle of elevation of — degrees — minutes went — yds. What angle of elevation should be used for the 3d shot? (2.5.)

Distance to target — yds. 1st shot with angle of elevation of — degrees — minutes and — points allowance — went — yds. and — yds. R (or L), 2d shot with angle of elevation of — degrees



— minutes and — points allowance — went — yds. and — yds.  
 — Give the laying for the 3d shot. (5.)

Examples from tables of fire by Lt.Col. Rodgers (Artillery memoranda No. 1, A.G.O. 1893). Table for — gun pp. — and — Range — yds. Wind — mile at III (or IX). Give the the angle of departure and allowance. (5.)

*a.* Taking the jump as — minutes, what is the angle of elevation? (5.)

*b.* What is the quadrant angle when the angle of sight is — minutes? (5.)

*c.* With the laying as determined in *b* the shot goes — yds. over and — yds. —. Give the laying for the next shot. (2.5.)

Examples from tables of fire by Capt. Ingalls (Artillery memoranda No. 1, A.G.O. 1896). Range table for the 8" B.L.R. Examples 1 and 3, page 3.

Range table for the 10" B.L.R. Examples 3 and 4 pages 8 and 9. (5.)

Range table for the 12" B.L. Mortar Range — yds. with a charge of — pounds — powder, what is the quadrant angle and time of flight? (5.)

10. *Cordage, Blocks and Tackle and Mechanical Manœuvres.*— Cordage. How is the size of a rope given and how is it measured? (2.)

Point out *a* bight and *the* bight of the rope. (2.) Seize two parts of a rope. (2.)

Mouse the hook of a block. Put on a nippering. Whip the end of a rope.

What is a strap and how is it used? (2.)

Knots. Make the — knot. For what purpose is it used? (Figure of eight, reef or square, bowline, bowline on the bight, anchor, single wall, wall and crown, drag rope, man harness.) (1 each.)

Bends. Make the — bend. For what purpose is it used?

(Sheet, double sheet, carrick.) (1 each.)

Hitches. Make the — hitch. For what purpose is it used?

(Half, two half, clove, timber, rolling or stopper, single and double blackwall, sheep shank, cat's-paw, marline spike.) (1 each.)

Splices. Name the splices and tell where they would be used. (1.)

Lashings. Make the shear lashing for raising light weights. Make the shear lashing for raising heavy weights. In these lash-

ings which are the racking, riding and frapping turns? (2 each lashing.)

Lash the hook of a block to a spar. Put on a strap for lifting a box. For lifting a barrel with one head out? (2.)

Blocks and tackle. Reeve the — tackle and show how it can be used to the best advantage in lifting and in hauling. (Gun garrison gin, luff, single Burton, double Burton, luff upon a luff, whip upon a double Burton, luff upon a double Burton.) (1 each.)

Mechanical manœuvres. Give the relative positions of the parts and distances to be observed in the use of shears. (1.) Go through the motions of lifting with and trip the hydraulic jack. (1.)

With the weight suspended shift the fall on the windlass of the gin. (5.)

Place the blocks for dismounting the 10" S. B. gun. (5.)

Place the sling on the — piece for dismounting with the gin. (5.)

Reeve and place the tackle for moving the 15" S. B. gun on the cradle. (5.)

#### GUNNERY SPECIALISTS EXAMINATION.

1. *Communications.*—(a) Telegraphy and Signalling. In order to qualify the competitor must be perfect under this subhead the rate required being 5 words per minute with flag and torch and 10 per minute by telegraph. The messages should be those customarily used at target practice and vessel tracking. Authorized abbreviations are to be used and all messages recorded.

Take angle to target No. 1. Check zero line. Zero line at last observation was out plus — minutes. Take angles on steamer with red band on stack coming in. Ready — two — take, etc.

Target angle is — degrees — minutes, etc.

(b) Batteries, lines and instruments. The following questions are on subjects of instruction given in Artillery Circular "C," Lieut. Geo. L. Anderson, 4th Artillery.

Batteries. Set up a gravity cell. (10.) Inspect and report the condition of the battery used on the post telegraph line. (10.) Remount the cells that require it in a battery. (10.) Connect — gravity cells into a battery. (10.)

Lines. For the purpose of the examination a short line can be used and faults which can be readily repaired should be made

by the examiner. Repair a break in a telegraph line. (10.) Attach the line to pole insulator. (10.) Trace a fault (one in the line). (10.) Erect a portion of the line between — and —. (10.)

Instruments. Connect in circuit a battery, key and sounder. (5.) Connect a key, sounder, relay and batteries showing the main and local circuits. (10.) Trace faults due to bad connections. (10.)

Communication by telegraph only is contemplated in the schedule, but at many posts the telephone is used, in that case similar questions to the foregoing could be taken from paragraph VI, p. 49, Artillery Circular "C."

*Use of Meteorological Instruments and Range Table Work.*—(a) Connect in circuit a battery, bell and anemometer. (10.)

The connection pins on the dial of the anemometer being at the numbers representing miles, what is the velocity in miles per hour when the interval between rings is — minutes? — minutes — seconds? etc. (10.)

The anemometer for use with the Marvin register makes connection at 1/20 miles. When this anemometer is used with a bell and the interval between rings is — seconds, what is the velocity in miles per hour? The anemometer is being used without the bell and the reading on the dial is 1.8, 5 minutes afterward it is 3.4, what is the velocity? (10.)

The reading is 9.6 and in 6 minutes it is 2.2, what is the velocity? (1.)

(b) Adjust the scale and make readings on the mercurial barometer. Make readings on the aneroid barometer. (10.)

(c) Make readings on the thermometer. (10.)

(d) Range table work. The tables available are those of Lieut.-Col. Rodgers and Capt. Ingalls published in the Artillery memoranda.

The tables of wind coefficients by Lieuts. Whistler and Ruckman and of the I. V. corresponding to different densities of loading (8" C. R.) published in the *Journal of the U. S. Artillery*. Table III Ingalls' Handbook. Table of tangents (to determine the angle of sight). Table of wind components, form 311. Graphic tables.

Problem I. Given — piece, charge — lbs. — powder, projectile —, — lbs., distance to target — yds., I. V. — f. s., bar. — in., ther. — degrees, wind — miles at 9 o'clock, jump — minutes.

FORM ON WHICH TO CALCULATE THE RANGE TABLE PROBLEMS.

Data. Gun.	Elevation.	Corrections.		Deviation.		Points.	
		+	-			R	L
Wind miles o'clock.	Component $\times =$ Coefficient $\times =$			Wind miles o'clock.	Component $\times =$ Coefficient $\times =$		
Range.	Corrected range =			Drift.			
				Movement of target.			
I. V.							
					Total allowance.		
Bar. Ther.	See note. $\frac{\delta}{\delta} =$			$r'$ in azimuth = $\times \times .000291 =$ Allowance in azimuth = Azimuth of target = Laying in azimuth =			
Wt. of projectile.				Angle of fall.			
				Time of flight.			
	Total correction.						

$\phi =$   
 jump =  
 Angle of elev. =  
 For diff. of lev.  
 Quadrant angle: =

NOTE.— $\Delta\phi$  for  $\Delta C$  in using Rodgers' Tables for 8" C. R. with shot

$$= \frac{\left\{ \frac{\delta}{\delta} \times \text{wt. of proj.} \right\} - 180}{18} \left\{ \Delta\phi \text{ for } \Delta C = 1/10 C \right\}$$

Required the angle of elevation and allowance. (Variations in X, I. V., C. and effect of wind across the line of fire.) (25.)

Problem II. Given — piece, charge — lbs. — powder, projectile —, — lbs., distance to target — yds., I. V. — f. s., bar. — in., ther. — degrees, wind — miles at — o'clock. (25.) (Varia-



tions in X, I. V., C. effect of wind in range and deviation, drift and jump.)

Problem III. Given 8" C. R., charge 35 lbs., Hex. powder, Butler shot 182 lbs., when loaded the base of shot is 7.96 ft. from the face of the piece, bar. — in., ther. — degrees, wind — miles at — o'clock, distance to target — yds., height of piece above target — ft. Required the quadrant angle and allowance. (50.) (Variations in X, I. V. due to density of loading, C. effect of wind, jump, drift and height of piece above target.)

Problem IV. Those given in Artillery Memoranda No. 1, 1896.

Problem V. 12" B. L. Mortar charge 51 lbs. V. M. powder, quadrant angle 52 degrees, target 3 and 1/2 miles, azimuth — degrees — minutes. The shot with the above laying went 150 yds. over and 60 yds. R. Give the laying for the next shot. (25.)

Form 31m or that on page 563 will be found convenient for use with these problems.

## A SKETCHING BOARD.

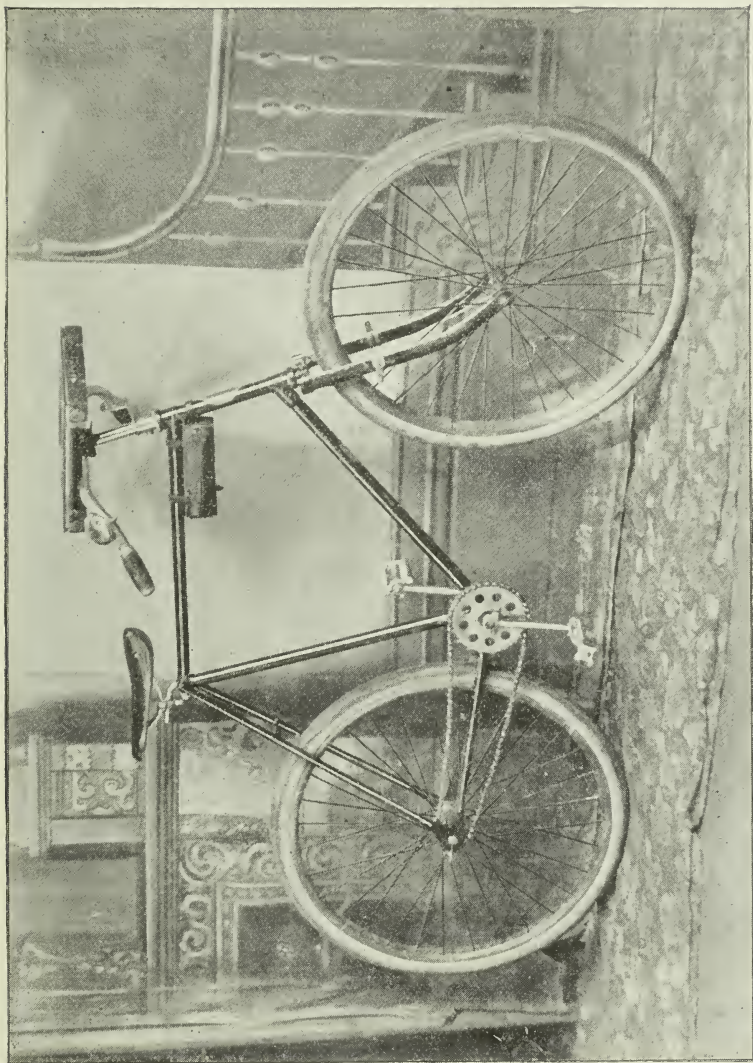
BY LIEUT. JAMES A. MOSS, 25TH U. S. INFANTRY.

THESE illustrations represent a compact and simple sketching board.

ABCD, a graduated metallic square circumscribed about a circle whose centre is at M; JQ and SP, two cylinders around which paper is wound; XYZW, a parallel steel ruler which moves about a pivot at M; NM, a steel arm to which the parallel ruler is attached.

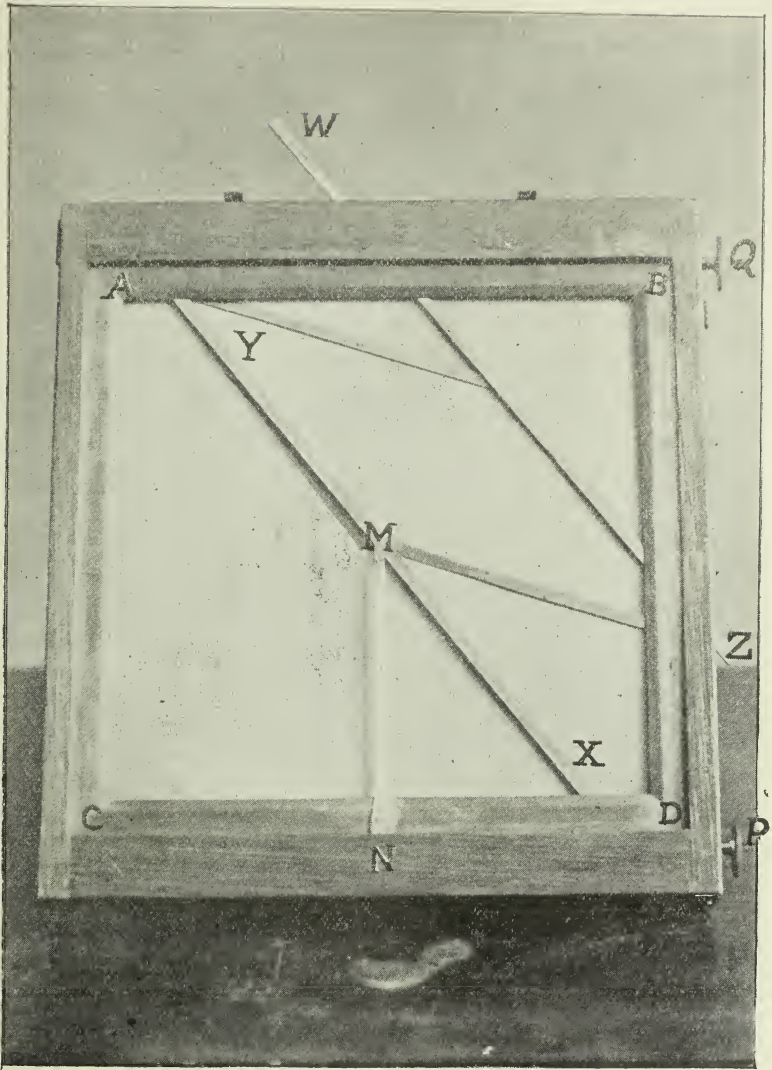
In order to illustrate its use, let us suppose the reading from the prismatic compass is  $N^{\circ}$ , and the map-maker is at T, any point within the square ABCD: Bring the centre line of the arm, XY, of the parallel ruler, to  $N^{\circ}$ , and holding it there with one hand throw out the other arm, ZW, to T: This gives the direction of the course, the length of which is laid off according to the scale of equal parts on the arm, ZW.

The body and top are made of hard wood, and a water-proof cover is used in case of rain.









case, however, on account of the iron of the bicycle, the compass cannot be attached to the board, and every time a reading is taken, the rider should lay his bicycle on the ground and step a few yards away. On fairly good roads, a section of country can be mapped much more accurately, in about one-third the time it could be done on a horse, using the regulation topographical note-book.



# Reprints and Translations.

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## WAR AND CIVILIZATION.

BY THE COMMANDER-IN CHIEF, LORD WOLSELEY.

*(From the United Service Magazine, London.)*

I HAVE selected a great, a serious subject for my address this evening, which I hope you may not find wearisome. Many an erudite treatise might be written upon the influence of war on civilization, and the number of three-volume novels which already deal with the social side of this question would fill the shelves of a goodly sized book-room.

It is, however, too large a subject to allow me to do more on this occasion than touch upon some of its aspects. My chief concern to-night is to put before you certain views as to the influence which the civilization of the present day has upon the military policy of the great States of Europe. I refer chiefly to the measures and the general military system adopted by those nations in their anxiety to be at all times ready for war upon the shortest notice. I desire also to call your attention to the influence which those measures are calculated to have upon the welfare of the people concerned. The extent to which war has affected human progress regards the past, but the considerations which I propose to put before you this evening are of living importance to the world at this moment.

That nations should always be prepared for immediate war is now recognized as a first necessity by all the great Continental Powers. This is a remarkable feature in the stage of civilization we have now reached, and is one of the results of the extraordinary advances made by science in the last half century. The facility and rapidity of communication afforded by steam and the electric telegraph, and the precision and astounding effects of the arms now in use, have rendered necessary this constant preparation for war. The object now most carefully attended to by the rulers of these States is to utilize for purposes of war all the manhood and all the resources of the nation, and to be able to mobilize them with the utmost rapidity.

That is the first point to which I wish to call your attention. The second is to show you that the machinery created for this purpose of rapid mobilization, and kept at all times in the most perfect order, is calculated to exercise an important and permanent influence upon the national life and welfare of those great States and upon civilization in general.

All healthy civilization engenders a strong national feeling, and develops a pride of race and a keen desire to see one's country great and powerful. Cosmopolitanism, on the other hand, according to the ardent patriot's views, is the growth of an unwholesome civilization, the deduction of a spiritless and unpatriotic philosophy.

Speaking here in Scotland's capital, I need not enlarge upon the merits of patriotism and love of country. They are in born instincts and qualities of the Scotch national character, and have helped to make Scottish history what it is. If I notice them, it is because I think, however different may be our views of this extraordinary spectacle of armed Europe standing ever ready for battle, all must recognize the sacrifices willingly made by these foreign nations for an object which they, one and all, believe to be essential for their national existence.

Towards the end of Queen Anne's reign, under the influence of strong party feeling, we were about to make what many believed was an undesirable, a discreditable peace. I find in a letter of that time Richard Steele expressing the hope that his writing may "rouse in this divided nation that lost thing called public spirit." I want you, my hearers, to understand that it is public spirit and love of country and pride in its greatness that now induce the great Continental nations to bear the burden which this constant readiness for battle imposes upon them. I wish you also to realize that heavy as that burden may be, it is in itself an invaluable species of national education, both physical and mental, for all classes, and that it serves and forwards, however undesignedly, some of the best interests of civilization in their highest aspect.

In the course of my remarks I shall have to speak of war from other points of view than those from which you, perhaps, are accustomed to regard it. To a large proportion of the world the very word "war" is repellent because it is only thought of in connection with its inevitable horrors.

I should like to read to you a short extract from the writings, not of a soldier but of a philosopher and a man of peace—I refer to Mr. Ruskin. It will show you the impression which the study of history made upon one of the most thoughtful and cultivated minds of our generation. He says:

"The common notion that peace and the virtues of civil life flourished together I found to be wholly untenable. Peace and the vices of civil life only flourish together. We talk of peace and learning, and of peace and plenty, and of peace and civilization; but I found that those were not the words which the muse of history coupled together; that on her lips the words were—peace and sensuality,—peace and selfishness,—peace and death. I found, in short, that all great nations learn their truth of word and strength of thought in war; that they were nourished in war and wasted by peace; taught by war and deceived by peace; trained by war and betrayed by peace—in a word, that they were born in war and expired in peace."

Now these are words which deserve to be well considered. What Mr. Ruskin, I think, means us to understand is, that peace has its dangers, very great dangers, to the moral well-being of men and nations; and that war, rough nurse as it is, has brought out some of the better, hardier and truer qualities of human nature.

Again, in another passage regarding the arts of peace, he says:

"All the pure and noble arts of peace are founded on war; no great art ever yet rose on earth but among a nation of soldiers. There is no art among a shepherd people if it remain at peace. There is no great art possible to a nation but that which is based on battle."

Had this been written by a soldier, many would have denounced him, but coming from Mr. Ruskin, the man of peace, it will, I am sure, meet with a more generous reception.

War is so terrible a scourge in itself, and is attended with such scenes of horror, that all who have ever witnessed them must shudder at their bare remembrance. Violence and death are in its right hand; destruction and desolation are its handmaids, and behind it follows a ghastly train of suffering, sickness, misery and mourning.

I know something of war's horrors from personal experience, and no man loathes them more sincerely. Where indeed is the educated and humane man in any civilized nation who does not wish that all war should become impossible. Is it not one of our most cherished spiritual longings that the Great Being who once said, "Let there be light," should now say, "Let there be peace for evermore"? But until those blessed words be spoken, do not let us live in a fool's paradise, believing that wars will cease. We are warned by all nature around us, which is always at war, as well as by revelation, that no such happiness can be ours under the present dispensation.

I should be very sorry if anything I may say here this evening could be twisted into a seeming approval of war. But yet I cannot forget that, "as out of the strong comes forth sweetness," so war with all its evils calls out and puts to the proof some of the highest and best qualities of man. Fearlessness, daring, endurance, contempt of death, self-sacrifice, readiness to die for country or some other sacred cause—all these are virtues which have often saved nations when at their last gasp.

War in itself, in its nature, must often come into conflict with the best agencies of civilization. This must necessarily be the case, for civilization may be said to presuppose a people busied in enlarging the common stock of everything that is most calculated to benefit human nature. It fosters art, science, literature and all that enlarges the scope of man's earthly enjoyment. It means a people living with great individual liberty in a condition of peace and established order. But where war rages, all these enjoyments and advantages either suffer or are temporarily suspended. The will of the commander takes the place of law, industries are more or less interrupted, and all social progress is checked.

Yet, without doubt, many wars further the best interests of humanity—wars, for instance, with barbarous nations—and it is curious to note that, as historians now tell us, the whole spirit of modern liberty had its origin with the rude and barbarous hordes which destroyed the Roman empire. History tells us also that upon many occasions when nations had begun to decline and to deteriorate in fibre, war has often acted as a sharp corrective of sloth and luxury and that want of national spirit which is the outward sign of internal decay.

"Peace on earth and good-will towards men," the ideal condition of human existence, is the dream of a better world. We earnestly wish for its realization. Let us pray for it with heart and soul; but until the Prince of Peace comes once more amongst us, any nation that means to be great and to hold its own against all comers must be ever ready for war with all its

attendant horrors. Let us never forget that of the Lord of Hosts, the Lord of Armies, it is written : " In Righteousness He doth judge and make war."

War always has been and always will be the final court of appeal between nations. No form of government can secure you an immunity from it if you are determined to hold your own as an independent people. The longest and most deadly and by far the most costly of all modern wars was waged in a republic—I refer to the civil struggle between the North and South in the United States of America. It had its peculiar horrors, and they were terrible. In passing, may I ask you to note one peculiarity about it? No regular army fought on either side. It was carried through by troops whose rank and file were by no means better, if as well trained as either our militia or volunteer forces.

In our cities, in our homes, we strive to protect ourselves and families from disease by sanitary precautions, and science helps us much in doing so. But, act as we may, we cannot wholly keep it from our doors. And so it is with war. Take our own case. As a Christian people it is our bounden duty, as a civilized nation it is in keeping with our professions, and as a trade-loving community it is our interest to avoid war. We honestly strive to act on this principle; but, notwithstanding all this, as a matter of fact, we have been at war somewhere or other nearly every year for the last fifty years!

So long as we live in an imperfect world with human nature as it is, so long as we have diversities of nations, of tongues, of religions, and of interests which bring men into conflict, so long shall we be liable to war. With this liability hanging over all the States of the world, it behooves their rulers to prepare for it. The nation determined to maintain its independence, to defend its honor, homes and rights, must be in the position of the strong man armed who keepeth his house.

May I venture to remind you of the many manly and noble virtues required by the soldier to fit him for his great share in this defense of the nation? He must learn to endure hunger, thirst, heat and cold; to undergo hardships and privations uncomplainingly, and to die when necessary for the safety or honor of his country. And the peaceful citizen of a great nation, he, too, has his duties in this matter of paramount importance. He, too, must make sacrifices if he would hand down to his children the priceless possession of national greatness and national independence. He must not, like the effete and cowardly citizens of Constantinople when besieged by the Turks, hoard or bury the treasure which, if liberally given to the state, would insure its safety.

The more men are fitted and willing either to endure these hardships or to make these sacrifices, the better citizens they are, and the more ready a nation is for war, the greater is its self-reliance, the more capable is it of guarding its independence, and the more worthy it is to be free.

The training involved in all this preparation for war is an invigorating antidote against that luxury and effeminacy which destroy nations, as well as individuals. This national training keeps healthy and robust the manhood of a state, and in saving it from degeneration nobly serves the cause of civilization.



May I advise you to study our little wars of the last half century, and to note for yourselves the effect they have had upon civilization? We are prone to remember them only for having increased our territory, and opened up new markets for our commerce. But is it not war that has widened the circle of civilization in all regions of the earth? Does not the advance of civilization in our own country prove this? Was not its introduction here the result of Roman victories? Then came the Saxons, the Danes, and lastly the Normans, all occupying our land as the prize of victory, and each and all helping us forward on the road towards civilization. Although each succeeding tide of invasion meant war and bloodshed and conquest, is it not true that an extended and improved civilization followed?

Is it not to internal warfare—rebellion, if you prefer to call it—that we very largely owe our liberties? Was it not by force the barons of England obtained our great charter? Have we not always been, if a proud nation, also a stiff-necked and stubborn people, tenacious of the rights enjoyed by our ancestors, and ready to resist aggression on the part of our kings?

Under strong provocation, we broke out into what we know as “The Great Rebellion,” which brought about the illegal trial and execution of a king who did not know how to concede the political freedom which his people were determined to have. Did not the wars of this great rebellion insure an increased liberty in both church and state.

Few will deny that the gradual building-up of our wide-extending empire has been the result of war. Go where you may in any direction—north, south, east or west—and ask how it was we obtained the territory you land on, and you will find that it was by war. How was it we acquired Canada or the West Indies, and other provinces in the Western hemisphere? What about the Cape of Good Hope and our African colonies generally, and, still further off, those stupendous and thickly-populated Eastern kingdoms? Were they not, one and all, won for you at the point of the British soldier’s bayonet? But in every instance, did not the war which added them to our empire extend the influence of Christianity and of the noble civilization which always follows upon our teaching of the Bible?

We do not force belief in Christ upon conquered people, but we do enforce the great principles of humanity and of civilized law which are the essence of our Saviour’s teaching. We do not compel the Hindoo to believe in the Trinity, but we do say to him, You shall no longer murder female infants, nor will we permit your widows to sacrifice themselves upon their husband’s funeral pyre, according to your long-established customs.

Wherever we hoist our flag, there we honestly strive—not always, I confess, with complete success—to establish those immutable principles of even-handed justice, and of an improved morality which are the best evidence of an improved civilization. As a nation, we can point with pride to territories once barbarous but now civilized, in every quarter of the globe where we have, or used to have garrisons. We honestly try to act as if we were rather the trustees of civilization than the occupiers of soil acquired through conquest. We do not selfishly lock up the provinces so acquired, and hold them exclusively for ourselves or for our trade.

In other words, ladies and gentlemen, the wars which extend our frontiers bring new territory under the influence of missionary work, of our laws, and of our civilization.

It is commonly and wisely said that trade and commerce follow our flag, but I contend we can assert with equal truth that Christianity and civilization, with all their attendant blessings, press forward very closely with both flag and commerce. Though not always wise in dealing with subject races, our unwisdom never takes the form of cruelty or cunning or religious bigotry, nor are we ever premeditatedly unfair or unjust. Our object is to confer upon them the blessings of civilization, and I maintain that we have not been unsuccessful in those efforts. But I would have you remember that the boons we thus confer have their origin in war.

Looking broadly at the question of how war has influenced civilization, I am bound to say that, on the whole, it has helped the cause of human progress. Man's best interests have often been furthered by it.

Where is now the sanguine man who, looking round upon the world as it is at this moment, can give us any assurance of a prolonged peace? Does not Europe bristle with bayonets? What are they meant for? Go abroad, and what is it the eye meets everywhere? Why, soldiers. But still more you can tell by the well set-up appearance of all the young men you meet that they, too, are trained soldiers who, though now in civil garb, would be in the ranks fully equipped within a few hours of war being declared. The whole male population under forty would be in arms, for all have gone through that soldier-making machine which takes in recruits at one end, and in the space of two years turns them out trained fighting men at the other.

In all the great European armies it is the whole manhood of the nation you now see in arms learning to be soldiers. This is a tremendous fact and is a curious commentary upon the fair-weather prophecies of the amiable men who assured the world half a century ago that the era of war was a thing of the past. We were then told that free trade and the civilization it was to inaugurate would render war impossible before the nineteenth century came to an end. Yet here we have at present, in the last few years of that century, every great capital of Europe crowded with men learning the art of killing, whilst in every town, almost in every village, the voice of the drill-sergeant is to be heard daily. And this is the result of our present-day civilization upon all the great States of Europe! It is most natural that the Englishman when studying this military system for the first time should exclaim how saddening it is to count up the many millions of civilized men whose whole attention for two of the most important years of their lives is now directed to thoughts of war and to making themselves efficient soldiers. We cannot blink at the fact, however strange it may seem to us, that civilization should give us such a result.

The system to which I have referred as being now in force in all the great Continental States is a system of universal military or naval service. Subject to a few exceptions, all young men of twenty are obliged by law to join the army or the navy for about two years; but I am only concerned

here with the army. That is a short period of service when compared with the seven or eight years the soldier who enlists in our army has to serve ; but during those two years the foreign recruit is worked in a manner that would be impossible in an army composed like ours of voluntarily-enlisted men. If we attempted to imitate the German army in this respect, we should obtain very few recruits indeed. The fact, too, that these foreign armies only receive men of twenty as recruits whilst we are obliged to take boys of seventeen and eighteen for our army, because we can't get men, is another point of difference between us that is little understood here. For the two years the recruit remains with his regiment, he is well clothed, housed and fed, and he is taught the virtues required for the good citizen as well as for the gallant soldier. He learns to be truthful, honest in all his dealings, to be tidy and punctual, and to be obedient to superiors. He is taught to respect the law and is inspired with a love of regiment which is near akin to love of king and country. At the end of his two years' military education the recruit returns to his family and to his ordinary civil occupations in every way, morally and physically, a better man, a better subject, and a more useful and intelligent citizen than when he left his home.

I leave the philosopher to determine how such a system of universal military education will affect human thought in another two or three generations. But I would have you remember that this is the result of civilization re-acting upon war and not of war's influence upon civilization.

I have spent my life amongst soldiers, and I can tell you from experience that the training of the body and the education of the mind which they receive, so far from tending to unfit them to be good subjects or useful citizens, have precisely the opposite effect. In many ways it improves all men, and in a country like ours, where we have so few soldiers, it gives the young men of twenty-four or twenty five years of age, returning to civil occupations, many advantages over his civilian brother in the after race of life.

Some people may think that in saying this I am like the shoemaker who says there is nothing like leather, bound as a soldier to praise the soldier's education. But they cannot suppose that it is from a similar cause so many cadets corps have been started by civilians of late years. Few people know as much as Miss Octavia Hill of the needs and the condition of the waifs and strays of London and other cities. She so fully appreciates the value of a military training for these outcast lads, that she and other philanthropists have started boys' brigades for their education. They find that habits of discipline, order and punctuality, and the pride and pleasure in the comradeship and unity with which they can work together as members of a body, have a vitality and individuality of their own which constitute no mean order of education for them. It is, they think, the best cure for the disintegrating selfishness, the "heave-half-a-brick-at-his-head" sort of spirit in which it is their tendency to meet their neighbor. It is found that this sort of mental and bodily discipline soon teaches them how much more pleasure and strength there is in union than in disorder.

When upon this particular point I may add that most people will, I

think, agree with Mr. Darwin's saying that "selfish and contentious people will not cohere, and that without coherence nothing can be effected." He adds, "The advantages which disciplined soldiers have over undisciplined hordes follows chiefly from the confidence which each man has in his comrades." Mr. Darwin here describes to you, better than I could, one of the great advantages which all men of all classes reap from military discipline. Although he had not, may I venture to say so here, the good fortune to be a soldier himself, he saw so clearly into the soldier's life and training that he at once laid his finger upon the special point of a soldier's education that imparts strength and gives success to armies in the field. It is that same coherence which makes nations strong and respected.

The faculty of organization which a sound military system engenders is of the first importance in all commercial undertakings. The mutual confidence that exists between all ranks and all individuals in an army, and which the soldier comes to have in his officers and in his comrades under all circumstances, reacts upon the business of life in all its phases, public and private, commercial and political. The soldier learns by experience not only to trust and obey his officer, but that no success in war can be achieved unless he does so. It is, I think, the fact of this feeling being so largely carried into civil life by the thousands of soldiers who annually leave the army, that largely saves Germany from those strikes and quarrels between employers and employed which at times so often threaten the manufacturing prosperity of this country.

So little is known in Great Britain of the system of universal military and naval service that, if a soldier ventures to point out its good side, straightway, many people rush to the conclusion that he is a military fanatic who would like to force this system on the nation. The soldier, it would seem, is popularly believed to have but one fixed idea, namely, the creation of an enormous army quite regardless of what the country's military needs may be.

I must guard myself against any such construction being put upon what I say, for there is no such intention in my mind. Happily, owing to our insular position, we do not require a huge army like those we see on the Continent. Happily, too, we are saved from such a necessity by the voluntary military spirit which is in our people. As a proof of this I may mention that last year, and it was a fair average year, the numbers enlisted for the regular forces, the militia, the yeomanry and the volunteers amounted to over 120,000 men.

Now I stoutly maintain that civilization in the United Kingdom is *pro tanto* the gainer, for every one of those recruits when discharged will be a better man, a better citizen, than he was the day he first put on her Majesty's uniform. How many thousands of men are thus annually saved from falling into bad ways by joining the greatest of all our public schools—I mean the army—and by what they learn in that most excellent of all public training colleges. May I not, therefore, claim for our national army the position of being a great agency constantly at work amongst us in the interests of civilization. We certainly must have an army to defend these islands, to hold our great Eastern empire, and to garrison our coaling-



stations and fortresses abroad. But the army required for these purposes is small when compared with those on the Continent, which are supplied, and could only be supplied, by means of universal military service, a system that is not suited to the form of government under which we live. But although the army we require is comparatively small, it should be sufficient in number for the duties it has to fulfil both at home and abroad. In fixing its strength we should not forget what was reported by the commission which considered the defense of France soon after the fall of Paris and the end of the Franco-German War. The extract I would call your attention to is as follows: "The maintenance of an army is an annual premium of insurance against foreign invasion. You cannot diminish the premium without at the same time reducing the safeguards of the country. Forgetfulness of this fact cost us two provinces and £200,000,000."

The fact that we have no need here for a system of universal military service should not blind us to the merits of that system as it is applied abroad.

That system has always struck me as essentially democratic in principle, for it seems to reduce all men to the same level. Prince, peer, shopkeeper and peasant—all have to serve the State for the same allotted period in peace, and in the event of war to serve throughout it. There is something grand and noble and national about this practice which appeals to the imagination of men in all classes of a state.

For another thing, it is very evident to me that this military training of the manhood of Continental nations must have a great influence upon the physical development of the people, and consequently upon civilization in one of its most important phases. It fulfils a great educational function, and it is difficult to appreciate to its full extent the benefit which the people generally of any country must derive from the moral and physical training received by its young men when learning the soldier's trade. In fact, how much the years spent under military discipline improves those young men socially!

Whilst, then, I am no advocate for the introduction here of the Continental military system, I should very much like to see some compulsory system of universal physical training established by law for all the young men and women of the kingdom. We insist now upon a system of compulsory education for the mind. Why should it be more difficult or more despotic to insist upon a training of the body? The sound mind and sound body go together. Woe to the nation which restricts its free education to the improvement of the mind but leaves the bodies of its scholars to be as bent and crooked as the letters they learn, and with narrow and hollow chests which tell their own tale of physical weakness. In our Regular Army the physical training of every man is carefully attended to. A large number, some 25,000 men, pass from it annually into civil life. In a small way, therefore, the weapon you forge for war thus exercises a healthy influence upon the civilization of the nation at large.

My object has been to show you that this system of universal service is not all bad as some would have you believe, and that the nation which for many generations does submit to its burden is bound to become eventually

a finer race of men and women, of healthier and stronger mothers and fathers, than the people who are content to see their children grow up, under practically no control, in the squalor and unwholesome moral and physical atmosphere which so largely characterize the lodgings of the poor in our great cities.

Surely the physical training of a nation's young men is a matter of the first consequence? In my opinion the greatest blot upon our present school system is that we strive to cram the head of the crossing-sweeper's son with Latin and mathematics, and to teach his daughter the piano, but do little to develop the muscular strength of those young people. Every school-house should have a gymnasium of some sort attached to it, and surely a good gymnastic instructor is quite as important a teacher of our boys and girls as the schoolmaster and schoolmistress who honestly strive, and nobly strive, I may add, to fill the heads of their pupils with book knowledge? We think too much of their heads and too little of their health.

None can have a higher appreciation of the advantages of mental culture than I have. No modern nation can be great where book education is neglected. But all the book education in the world without strong limbs will fail to make a nation powerful. We have numberless examples in history of nations steeped in literature and learned in the schools of philosophy which were destroyed, almost exterminated, by hordes of barbarians who knew nothing of letters, and who thought the best thing to do with a library was to burn it.

It is because I believe that the nation which neglects the physical training of its boys and girls is bound to deteriorate that I hail with so much pleasure the establishment of boys' brigades throughout the country, and trust that their number will increase. The volunteer movement in 1859 rectified the faults of our rulers who had failed to provide effectually for the defense of this country, and in the same way I regard the creation of these boys' brigades as a sort of silent protest against the neglect hitherto shown to the physical training of the people.

If war be less frequent than in barbaric ages, or even in later centuries when nations fought with small standing armies, it is not because of any waning of military spirit amongst European nations. It is, I believe, because war between nations that have adopted the system of universal service has become too terrible to be lightly undertaken. Kings and other rulers hesitate to embark in a war which will no longer be a mere series of battles between standing armies, but a life and death struggle between the whole manhood of the contending nations, and consequently on a scale too big to admit of results being safely calculated. The very vastness of the armies now kept ready for war at the shortest notice seems to constitute one of our best guarantees for peace. It is in any case satisfactory to feel that, whilst there is no falling off in intellectual activity, the civilization of to-day with all its attendant wealth, has not as yet in any way weakened the manliness or lessened the courage of men. It does not prevent us from contemplating the possibility of war or from duly and manfully preparing to meet its horrors when necessary. It does not rob nations

of the patriotic spirit which has inspired men from earliest times to prefer war rather than suffer wrong or submit to national insult. In other words, this constant preparation for war saves the civilization of to-day from the corrupting effeminacy and luxury which directly led to the destruction of Greece, of Carthage, and of Rome.

We all want peace, none more than the millions of soldiers now in Europe, and we can best secure it by being at all times prepared for war. To be in that fortunate position of preparation there must be kept alive amongst all classes that manly respect for private and national honor upon which true military spirit lives and is nourished. There is nothing antagonistic between the pursuits of peace, between great individual as well as national prosperity, and the most perfect preparation for war. The condition of Europe at this moment is a proof of how naturally the spirit of trade, literature, science, and philosophy blends with the warlike instincts of a people. Civilization is as the bread of daily life; but the sturdy fighting spirit which now happily characterizes it is as the salt which makes all bread wholesome.

In dealing with the influence that war has exercised upon the progress of civilization in past ages, we have ample materials to guide us in forming an opinion. History tells us how it acted then upon the morality of man as well as upon his actions. War has not always favored human happiness or extended the area of civilization. It cannot be pretended that the great inroads of barbarians into settled countries increased the stock of human happiness. It cannot be pretended that the great Mohammedan conquests which swept over many Christian countries and converted some of the most favored portions of the earth into wastes, and some of the fairest and richest of cities into ruins, have helped civilization. But, on the other hand, it would seem as if every march forward made by man along the road of human progress has been ushered in by war and bloodshed. The advanced guard of progress has often been an army clearing a great highway through the jungle of barbarism for the civilizing influences that marched close behind under its immediate protection.

But what interests us most now is, how will this great and ceaseless preparation and training of whole nations for war affect the happiness and the future well-being of man in general? Can we argue from the results of wars that were waged under entirely different aspects; that were carried out by hired soldiers, whose thoughts and aspirations were simply professional and by no means in harmony with the feelings of the farmer, the mechanic, and the mercantile and other classes of civil life? The wars of past ages were accompanied by greater human suffering and by greater cruelty than those of the present day. They were carried out by a section apart from the rest of the community, by what I may call a military caste of drilled but uneducated men drawn from a low class of society, and whom these horrors did not consequently shock. Although those wars often lasted many years, they did not as a rule directly affect the moral character of the nations engaged as great wars do now. Nations did not then take the field themselves; they fought by deputy, being generally represented by armies of hired professional soldiers. But in future all wars and

warfare will be different. We shall have in the field not mere armies, but the whole virile manhood of the nations engaged. The shock will be sudden and tremendous and the effect so great, that no land war fought with regular armies can last long. One of the most hopeful aspects connected with wars yet to come is that they must be short.

We have the experience of three recent wars, waged by the most military of European nations, to draw lessons from, and I often ask myself, how have those wars influenced human progress and the general condition of European civilization? Have they in any way retarded its advance or lessened the benefits it confers on man? We all know as an historical fact that the earliest of these three wars insured the unity of Germany and transferred what I may term the presidency over all German States from Vienna to Berlin. In one respect, at least, it conferred a great benefit upon the conquered, for it broke up the dominion of priestly despotism and, in the best sense of the term, promoted civilization. It led almost immediately to the termination of the hereditary feud between Austria and Hungary, which had been the weakness of the empire in former times. It also settled old Austrian differences with Italy, and has been the means of establishing a close treaty union between those two states formerly so hostile. The second of these wars cemented and strengthened that unity so long the dream of the German poet and the heart-felt aspiration of every thinker in the Fatherland. The third war gave a blow to the Turk in Europe from which he can never recover, and won back from barbarism the promising young state of Bulgaria.

It is curious to note how quickly the military training given to all classes by this system of universal service solidified German unity, and made a nation out of what had been before a mere group of scattered provinces, each jealous of the other. This common training gave renewed strength and a vigorous impulse to German sentiment in all parts of Germany, and has had much to do with the formation of the great, the splendid German empire of to-day. But the most striking illustration of how this system of universal military training can bring together the several strands that make up the rope of national life, is to be found in Italy. Before that country had again become one nation from the Alps to Brindisi, there was no bond of union between her scattered provinces. There was little in common between the fighting-men of Piedmont and the unwarlike southerners. Without any doubt, the system of universal military service adopted by Italy has done much to make honest men of the Sicilian banditti, and to inspire the Neapolitan lazzaroni with some respect for truth and honesty. In fact, it has converted the many Italian principalities and states of fifty years ago, each with its peculiar idiosyncrasies, into the consolidated Italy of to-day, with its large army and powerful fleet. It is compulsory military service with the mental discipline it teaches that has to a large extent created, as it still fosters, the national sentiment of loyalty to king and constitution that had so little previous hold upon Italian imagination. It has been well said that "the nation and the army exercised a reciprocal influence on each other, of which the happy effects are now felt everywhere."

Able men have often urged that the creation of a military class would



endanger liberty and free institutions, and divert the energy and aspirations of a people from profitable objects and from all that tends to civilize man, to thoughts of war and to national aggrandizement by war; but this has not been its effect upon the great European States. On the contrary, it has in every instance associated itself with all the most vigorous impulses of national life, and has secured the world a lengthened peace. The military training which our soldiers—which all soldiers—now receive must inevitably have a great influence upon their future as citizens. Whilst it implants in them a patriotism unknown before, and impresses them with a sense of that national duty which makes men sacrifice everything for country's sake when necessary, it also enlarges the intellectual power they have to depend upon to obtain a livelihood in after life. In other words, individually it civilizes and enables them to enjoy life better, and nationally it makes them more useful members of the community than they were before.

I do not think the statesmen of to-day have sufficiently studied the effect that the drill-sergeant of Europe will have upon man, morally and physically in the next few generations; for, in order to make men into good soldiers now, we must develop their moral worth as well as train their bodies. My study of the question leads me to believe that, wherever all the physically strong of a nation are converted into trained soldiers under this new military system, the result will be decidedly in favor of an improved civilization.

When we had finally disposed of Napoleon, that mighty peace-destroyer, many persons thought the world had reached a new epoch in civilization. A new school of philosophy arose, and assured us that an entirely new condition of life was before mankind. We were told that, as civilization advanced, military spirit—the essence, the mainspring of armies and of a nation's fighting strength—would decline proportionately. This new school of thinkers told us that wars would cease, because the spirit and passions which led to wars would decline, and finally disappear under the mighty wave of advancing civilization. The world's history for the last half century is a cruel mockery of these prophecies, the dreams of a highly-cultivated, over-sensitive intellect rather than the prosaic deductions of common-sense.

These assurances so misled the British people that our navy was allowed to dwindle in size and fall off in fighting appliances, and our army to become absolutely inefficient. What was the result? When a Ministry, ignorant of war, allowed us to drift into a great conflict with Russia, though the bravery of our troops was as conspicuous as ever, the result showed the inadequacy, the inefficiency, of our military system.

A sincere lover of peace, I would warn you against those who would have you neglect the arts of war; who would prevent you from making those preparations for war which are, after all, the best and most effective guarantees of peace.

That the decay of military spirit, and, consequently, of the fighting power of a nation, leads to accumulated disaster, we have recently had a striking example in the complete overthrow of China by a comparatively

small and neighboring state. The Chinese are, above most races, apparently designed to be a great military, naval, and conquering people. They possess all the important attributes that enable men to be easily and quickly converted into excellent soldiers and sailors. Although it may be news to many, I assert them to be naturally plucky, and, as far as I have been able to judge of men under fire, quite indifferent to death. Physically, they are a very muscular people, trained from childhood to hard and incessant labor. By disposition and by necessity they are most industrious. They possess great powers of endurance both in heat and in cold. Uncomplaining in misery and want, they can live on little, and that little the poorest of food. I have no hesitation in saying that, given a free hand, and allowed at first to draw upon England for officers and military instructors, I would guarantee to raise in a couple of years a great Chinese army which it would be hard indeed to beat. There is certainly nothing in the East that could beat it.

And yet, what did we lately see in China during its war with Japan? Why, the whole military and naval forces of a vast empire fell to pieces in one year when attacked by a small state that possessed a well-trained army and fleet.

How and why was this? How came it that so vast an empire, inhabited by several hundred millions of a brave, hardy and manly race, should have been so easily and so rapidly overthrown by its small neighbor?

My answer is, it was because all military spirit was not only allowed to decay and die out in China, but that for centuries the Chinese laws and customs had been—it would almost seem designedly—calculated to kill it. All national military spirit, as we understand it was crushed under the opprobrium which was attached to the fighting man's trade. To be a soldier was to be the lowest and most despised of Chinese mortals. The greed for intellectual culture shared in by all classes had created this feeling of contempt for the fighting man. Where manual labor is despised because it is labor, and all activity is regarded as more or less degrading, there can be no true military spirit, and, consequently, no fighting army. A nation in such a condition must be near its fall, and, until those who rule China fully comprehend all this, her condition, internally as well as externally, must go from bad to worse.

In a country where most positions in the public service are obtained by competitive examination, no young man of any talent, of any ambition, or of any public value, entered the Chinese army. It was only the stupid, and those who had failed to obtain posts in the civil service, who became military officers. This had been going on for generations, for centuries before the war with Japan, and the consequence was that the army had come, by long neglect and contempt, to deserve the position assigned it in the estimation of the Chinese people.

I need not allude to the many other influences that were at work to make it what it was. The point I want to emphasize is, that all military spirit having been allowed to die out in the Chinese people, endowed though they are with many of the qualities most necessary for the real soldier, their army was consequently worth nothing in the day of battle. It was a mere undis-

ciplined rabble, devoid of all fighting skill, patriotism or manly virtues, and with no honorable gentlemen as officers to lead it. It was as useless for all purposes of war, as mobs have always been. Like the mob armies of all history, it was formidable only to its own peaceful countrymen and countrywomen, the peaceful villagers with whom it daily came in contact.

I have a great regard for Chinamen, and firmly believe in the future of China. But it is very evident to me that it can never aspire to a vigorous national life until it creates a healthy military spirit throughout the length and breadth of its flowery land. That military spirit will not only give it armies for defense against all comers, but will create and foster what is much wanted there—a healthy national sentiment amongst all classes. One follows upon the other as a matter of course. Upon this military basis alone can we ever hope to see a sound and thriving civilization arise in China. And if the outcome of the recent war with Japan is to be the creation of a really effective Chinese army and navy, it will be found that military strength will bring a high form of civilization with it.

But if it should be said that this general decay of patriotic spirit in China is the result of a corrupt philosophy of an unchristian religion, how can we meet the story of the Turkish capture of the Imperial Christian city of Constantinople? You remember Gibbons' splendid description of that terrible catastrophe, of the ignominious collapse of all noble feeling of self-sacrifice and of self-respect. Never was a nation more steeped in the forms and profession, and what I may style the superstitions, which usually cling round a complicated and ornate religious ceremonial, than were the people of the Eastern empire at that time. Yet, when the enemy were at their gates, to quote Gibbons' words, "the avarice of the rich denied the emperor, and reserved for the Turks the secret treasures which might have" enabled him to complete the defenses of the city, and to have saved both them and it.

I need not pursue further the sad story of cowardly disloyalty which brought down the awful judgment of God upon that ill-fated city. The people cried out for an angel to save them, but few fought manfully, or practiced any one Christian virtue in the cause of king or country. They fell, and who pitied them?

As I read history, I find that lying, cheating, sensuality in its worst forms, and all the unmanly habits and practices of an effeminate and over-civilized people, overtook nations as at Constantinople when their military spirit and fighting qualities declined. A sound, healthy, military spirit gives strength to a people. It is the guardian of the honor and interests of a nation, the safeguard of its freedom and liberties, the purifier of its civilization, its defense against enemies from without, and degeneracy from within.

When the warlike instincts of a people decline, when the drill-sergeant and the gymnastic instructor are replaced in a nation's estimation by the ballet-dancer and the singer, not only does national power decline, but all healthy civilization seems also to perish with it.

When Greece, and Rome, and Carthage, and the Arabs who penetrated into Spain, were in the zenith of their strength, letters, the arts and sciences, and all that makes healthy civilization enjoyable, also flourished. But as

their military instinct died out, its place was filled with that unwholesome and corrupting civilization which led to their downfall.

One of my purposes this evening in describing the Continental system of military service has been to point out that it not only enables the great States of Europe to be always ready for war, but that it is in itself a fine national school for the physical and moral training of the people. I have endeavored to show how this education is bound to have a highly beneficial effect upon them, and, consequently, upon the general civilization of Europe. That although we have no need here for such a military system, we should not, on that account, ignore its effects upon other nations. I have striven to press upon you the necessity of securing for our own people the advantages of a thorough physical training, and to point out how essential it is for our own safety as a nation to have our army, small though it may be, at any rate sufficiently large for all our requirements at home and abroad.

This is not the wisdom of to-day. We are taught it in the pages of history. One of the lessons we there learn is embodied in a few short words by the deepest thinker, the greatest philosopher of our country—Lord Bacon. Writing upon “the true greatness of kingdoms,” he says: *Let it suffice that no estate expect to be great that is not awake upon any just occasion of arming.*

## THE SUPPLY OF AMMUNITION IN WAR FOR ALL ARMS.

BY GENERAL MAKSHAYEFF, RUSSIAN ARTILLERY.

(A comparative study embracing Germany, Austria, France, and Russia.)

Translated from the Russian by FIRST-LIEUTENANT H. T. ALLEN, 2d U. S. Cavalry.

WITH the development of rapid-fire guns the expenditure of ammunition has materially increased and as the rapidity of fire is one of the successes in war, the effort to increase it is but natural. Now we are not satisfied with that quickness of firing which was attained by guns with breech-blocks, and with single loading rifles. At the present time the latter have been replaced by magazine systems, while special appliances have been adopted to increase the fire of field-guns and to diminish their recoil. In this manner during engagements in future wars a great increase of expenditure of ammunition must be expected, especially if we consider the enormous masses which will be concentrated on the fields of battle and the fierceness of future battles—the most important of which will probably not be finished in one day. The enormous expenditure of ammunition in future engagements will require a very energetic and carefully arranged transportation of the same from the rear. An insufficiency of it in the fighting lines at a critical moment may



have direful results. Therefore in order that the troops be in complete readiness to accept and maintain a stubborn engagement it is necessary that they have on their persons a full supply of ammunition, and that the replenishing of it be carried on uninterruptedly. The fighting supply consists of the supply carried and the supply transported. The carried supply consists of a certain number of cartridges in cartridge bags, cartridge boxes, etc., *i. e.*, directly on the person. For guns the carried supply consists of shells and projectiles in the gun limbers. The transported supply of fighting ammunition consists of cartridges and projectiles transported in the regimental train, *i. e.*, in cartridge carts or wagons and caissons of the respective troops. For an uninterrupted replenishing of the expenditure of these supplies it is necessary that a certain mobile supply follow the troops in parks, that at the base of operations there be continually a certain reserve of ammunition, and that the communications between these parks and the base be assured.

The object of this article is to acquaint the readers with the organization of the German, Austrian and French armies in this respect in time of war and to compare them with the Russian.

Means of providing the German, Austrian, and French armies with ammunition :

#### GERMANY.

##### *I. Fighting Supply.—*

1. Rifle Cartridges.	Infantry.	Cavalry.	
On the soldier.....	150	50	
Regimental train.....	50	10	{ (only regiments forming divisions)
	<hr/>	<hr/>	
Total.....	200	60	

In the regimental train of infantry, cartridges are transported in 2-horse company wagons (*Compagnie-Patronenwagen*) one per company—all of which are in the train of the first order (*Kleine Baggage*). The cavalry regiments forming part of infantry divisions have no cartridge wagons in the regimental trains and therefore no cartridges are carried for them.

For cavalry regiments forming cavalry divisions ten cartridges per gun are carried in six cartridge wagons attached to one of the horse batteries of the division.\*

2. Artillery rounds per gun.	Field Artillery.	Horse Artillery.
In limbers.....	30	30
In caissons .....	115	115
	<hr/>	<hr/>
Total.....	145	145

Caissons are 9 to the battery and are divided into 2 echelons: 4 in the first, 5 in the second.†

##### *II. Rear Reserve.—*

To each corps belongs one park brigade (*Die Munitions Colonnen*).

\*A cavalry division consists of six cavalry regiments, two horse batteries, and one pioneer command.

†In each caisson there are 77 projectiles, therefore in 9 caissons there are 693, which gives 115 rounds for each of the 6 guns.

A park brigade consists of two sections, each of which consists of 2 infantry and 3 artillery columns, in all 4 infantry and 6 artillery columns or parks. Each infantry column consists of 23 six-horse cartridge wagons; in all, the 4 infantry columns of the corps transport 80 cartridges per infantry gun and 60 cartridges per cavalry gun. Each artillery column consists of 23 six-horse caissons and 3 reserve carriages. In the six artillery columns are transported 126 rounds per each field-gun and 135 per each horse gun. Each infantry as well as each artillery column is subdivided into 2 half columns, each of 3 platoons.

For each army there is designated one army park (Field Munitions Park) consisting of a depot established at a central railway station and of ten mobile columns.

In the army parks are 20 cartridges per rifle, 19 projectiles per field gun and 24 per horse.

In case the troops are at a considerable distance from the central station, mobile columns are sent out from the army park and from intermediate depots. The army park is replenished from the principal depot of ammunitions (Haupt Munitionen Depot) established in frontier fortresses, the quantity of munitions of which is not designated. The principal depot is replenished from the principal artillery depots of peace time.

### III. General Quantity of Ammunition.—

Place of Supplies.	For Infantry.	For Cavalry.		For Artillery.	
		Forming part of infantry divisions.	Forming cavalry divisions.	Field.	Horse.
On the men (artillery in the limber.) . . .	150	50	50	30	30
In the regimental train (artillery in the caissons) . . . . .	50		10	115	115
Total fighting supply . . . . .	260	50	60	145	145
In the mobile corps park . . . . .	80	60	60	126	135
Total mobile supply . . . . .	280	110	120	271	280
In the army park (depot) . . . . .	20	20	20	19	24
In the principal artillery depots, limit not fixed.					

### IV. Order of Supplying Fighting Lines with Ammunition.—

The exhaustion of ammunition deprives infantry of its principal strength in battle and renders artillery completely useless. For this reason the timely replenishing with ammunition constitutes an important duty of commanders of all grades. The expenditure of carried cartridges is made good from the company cartridge wagons which, in the beginning of the engagement, are placed as far as possible in covered localities not more than 800 metres from the line of fire; they are afterwards moved forward within the limits of safety. The carrying of cartridges from the wagons to the fighting line devolves upon battalion commanders who designate for this purpose men from the companies of the second line. Cartridges are given out from the wagons indiscriminately at every request for supplying the men who are engaged. Every reinforcement of the fighting line should carry with it a supply of cartridges for the men who are engaged.

Cartridges of the killed and wounded are collected. In battle the supply of cartridges carried on the person is not limited, but on the contrary the men carry as many as possible, in provision sacks and in their pockets. If a defensive battle is foreseen, especially if the position is prepared in advance, there must be a supply of cartridges collected in boxes or in other things. The emptied cartridge wagons of the regimental train are replaced on the field of battle by cartridge wagons of park columns, for which purpose the columns in anticipation of the battle have been advanced towards the field of battle; a certain number of the wagons advance to the field of battle itself, when their location as well as that of the whole column is communicated to the troops. After the engagement the supply of carried cartridges, likewise the supply in the company wagons should be at once replenished. If the corps moves in one general column, then the ammunition or park columns follow it in common columns of parks and transports in rear of the column of troops and the train. Every column of parks and transports (trains) is divided into two echelons; one section of the ammunition column (2 infantry and 3 artillery parks) is added to the 1st echelon and the other to the 2d and both move at the head of these echelons. Therefore the 1st section of the ammunition column is found approximately at 7 to 10 kilometres from the rear of the column of troops with their train; and the second, at 20 kilometres. As the column of troops of a corps with its train occupies about 30 kilometres, then the nearest section of the ammunition column may be considered, if an engagement takes place unexpectedly, at a distance of 40 kilometres, and the second at 50 kilometres, from the field of battle. Therefore in anticipation of the battle, part of the ammunition column is moved forward; if the corps marches in two columns the ammunition column is divided and follows the divisions. The order of replenishing the expenditure of artillery in battle is the following:

The 1st echelon of caissons on the march follows immediately behind its battery. The 2d echelons of all batteries of the advance guard and of the main command are formed together and follow immediately behind the command.

In going into battery ammunition for the first shots is taken from the limbers; then the limbers are moved back and take place with the first echelon of caissons as far as possible in a covered place, not more than 200 metres from the firing line. At this time 2 caissons per battery from the 1st echelon of caissons are sent forward to the guns and are placed 10 steps in rear; projectiles are taken from these caissons and carried to the guns. The 2d echelon of caissons is conducted towards the field of battle to not more than 600 metres in rear of the firing line, and it at once sends to the first echelon 2 caissons per battery. Empty caissons of the guns are replaced by full ones of the 1st echelon and empty ones of the 1st echelon by full ones of the 2d; the latter are replenished from the ammunition column which should be conducted to the field of battle at the proper time. The regulations call attention to an economical use of shells in battle. The rapidity of fire of six gun batteries under ordinary conditions is four shots per minute; in case of necessity the firing may be increased for a few minutes duration to 10 shots per minute.

## AUSTRIA.

*I. Fighting Supply.—*

1. Rifle Cartridges.	Infantry.	Cavalry.
On the soldier .....	100 *	50
Regimental train.....	42	..
	—	—
Total.....	142	50

In the regimental train of infantry, cartridges are transported in company cartridge wagons, one per company.

In the regimental train of cavalry there are no cartridge wagons.

2. Artillery Ammunition.	Field.	Horse. †
In the limber .....	34	19
In caissons (Batterie Munitions- wagen.).....	94	99

Caissons are drawn by six horses and are one per gun.

*II. Rear Reserve.—*

The rear reserve (Artillerie-Reserve-Anstalten) is divided into mobile and immobile.

The mobile reserve (Mobile Anstalten) consists of division, corps, and army parks, cavalry ammunition columns, and mountain division parks.

The immobile reserve (Stabile Anstalten) consists of army field depots and mountain field depots. To each infantry division ‡ also to each Landwehr division is attached one division park consisting of 3 columns—1 of infantry and 2 of artillery.

The object of the division park consists in providing all the troops of the division with ammunition, and in addition to this in replenishing the artillery with men, horses, and certain articles of material.

The infantry column of the division park consists of 30 four-horse cartridge wagons and carries 57 cartridges for each rifle.

The artillery column of the division park consists of 14 four-horse park caissons, 4 six-horse battery caissons and of one gun and two carriages with four horses each. The two artillery columns of the division park carry 110 projectiles for each gun of the division artillery.

The infantry column of the division park may in case of necessity be divided into 2 independent sections. The mountain division park carries 100 shells per gun, 30 cartridges per infantry rifle, and 15 cartridges per gun for cavalry and other troops.

Cavalry divisions are supplied with ammunition from the cavalry ammunition column, the purpose of which corresponds to that of division infantry parks.

A cavalry division is composed of 4 cavalry regiments, 2 rifle battalions,

\* Before beginning battle this number is increased to 120.

† In all field artillery since 1891 there is the same calibre, namely 9 centimetres. Mountain artillery is 7 centimetres. Field artillery has 8 guns, horse artillery 6, and mountain artillery 4 per battery.

‡ Composition of one infantry division is four regiments (of 4 and 3 battalions each), 1 chasseur battalion, 1 regiment of division cavalry and 1 regiment of division artillery of 4 batteries of 8 guns each.



1 division of artillery (*Reitende Batterie Division*) of 2 batteries of 6 guns each, and a cavalry telegraph section.

A cavalry ammunition column, at the rate of one to each division, consists of 2 four-horse park cartridge wagons, 5 four-horse park caissons, 8 six-horse battery caissons, and 2 guns each with four horses ; it carries 106 projectiles per gun, 9 cartridges per carbine and rifle, and 16 per revolver. To each corps is added one corps park consisting of one infantry and 2 artillery columns.

The corps park is intended to replenish the corps artillery with men, horses and ammunition ; for providing the corps with material ; the infantry columns of division parks with munitions, and the cavalry and technical troops of the corps with cartridges and explosive materials. The infantry columns consist of 32 four-horse park cartridge wagons and carry 18 cartridges per infantry and cavalry rifle, 13 for each rifle of the technical and train troops, 7 cartridges per revolver, and 6 cartridges per gun for the field artillery and the establishments in the rear. The two artillery columns of the rear park carry each 110 projectiles per gun for the corps artillery, and are of the same composition as the artillery columns of division parks. To each army is attached an army park intended to supply corps and division parks with ammunition and artillery material ; to make repairs in the artillery material of the corps ; and to take care of the guns and the material taken from the enemy.

The army park consists of as many reserve columns as there are corps in the army and of one reserve mobile arsenal (*Reserve-Zengs Kolonne*). Each reserve park column consists of the following four-horse wagons :

Forty-four cartridge wagons, 44 caissons, and 6 reserve carriages ; all the wagons belong to the State, but the horses are requisitioned. Each column bears a number corresponding to its corps and carries 20 cartridges per infantry and cavalry rifle and 35 projectiles per foot and horse gun. The reserve mobile arsenal consists of 41 four-horse wagons with material and instruments ; the wagons are governmental, the horses requisitioned. To the columns of all these parks, independent of the number of wagons cited additional requisitioned two-horse wagons may be added provided the conditions of the soil in the theatre of war demand it. This allows the normal freighting of the government wagons to be diminished by one-third which doubles the number of wagons of each column. For each army, and sometimes for several armies together, there is established in the rear an army artillery depot (*Army Munitions Feld Depot*) intended to supply all the rear mobile artillery establishments of the army with ammunition and artillery material.

The army artillery depot is established in rear beyond hostile attack, on suitable roads of communication, in localities where there are sufficient and convenient accommodations for depots and for the construction of workshops.

In the army cartridge depot is stored 25 cartridges for each infantry and cavalry rifle, 15 for each rifle of the technical and train troops, and also 130 shells for each field and horse gun.

## III. General Quantity of Ammunition—Mobile and Immobile.—

	Infantry.	Cavalry.	Artillery. Field.	Horse.	Technical and train troops.
On the soldier (in limbers for the artillery)	100	50	34	19	30
In regimental train ( " " " " )	42	..	94	99	..
Total fighting supply.....	142	50	128	118	30
In the division park.....	57	9	110	106	..
In the corps park.....	18	18	...	...	13
In the army park.....	26	26	35	35	..
Total in mobile rear establishments.....	101	53	145	141	43
Total mobile.....	243	103	273	259	43
In the army store.....	25	25	130	120	15

## IV. Order of Supplying Ammunition to the Fighting Line.—

The cartridge wagons of the regimental train and battery caissons replenish their expenditure from their corresponding columns of the division parks; but if there are nearer them other artillery war establishments, they replenish from them. Replenishing of the division and corps parks is made from the army park, but they may also be replenished directly from the army depot by special order of the field army administration. The army park is replenished from the army depot; the transportation is effected by railways, boats, or hired wagons. The replenishing of the army depot is effected by transportation from the interior artillery depots of the State. The general supervision of the supply of ammunition and other objects required by the artillery belongs to the chiefs of artillery of the armies. The transfer of supplies in the wagon of the rear devolves upon the artillery field officer belonging to the central rear administration.

## FRANCE.

## I. Fighting Supply.—

1. Cartridges.	Infantry.	Cavalry.
On the soldier.....	112	36
In the regimental train... ..	29	..
Total... ..	141	36

In the regimental train, cartridges are carried in battalion wagons drawn by four horses. The cavalry in the regimental train has no supply of cartridges, but for separate cavalry divisions having horse batteries at the rate of three per division, there are three four-horse cartridge wagons, which transport 36,280 cartridges. As the division consists of six regiments of four squadrons each, *i. e.*,  $6 \times 4 \times 120 = 2880$  carbines, the supply of these three wagons gives about fourteen cartridges per carbine.

2. Artillery Ammunition.	Corps Artillery.	Horse Artillery of Cavalry Divisions.
	8-cent. horse guns.	9-cent. field guns.
In limbers and caissons of bat- teries (six guns each).....	156	145
		142

Caissons exist in the following numbers in batteries:

In field and horse batteries of corps, 9 caissons; in horse batteries of cavalry divisions, 8 (instead of the ninth caisson of these batteries there is a caisson of cartridges for the cavalry).

## II. Rear Reserve.—

In every corps of two infantry divisions with artillery at the rate of six

batteries per division, and in corps artillery at the rate of eight batteries per division, there are two flying parks with small-arms ammunition and six flying parks with artillery ammunition. For each division there is one infantry park and two artillery parks. The composition of the flying infantry park is 32 four-horse cartridge wagons, of the flying artillery park 17 six-horse caissons. The flying parks carry in all 66 cartridges per infantry gun, 87 rounds per 8-centimetre horse guns, and 61 per 9-centimetre field-guns. For other kinds of guns there are no flying parks. In each corps there is one mobile or corps park, which consists of 69 six-horse and 12 four-horse caissons, also 45 four-horse cartridge wagons. It carries 47 cartridges for each infantry rifle, 62 rounds for each 8-centimetre horse and 52 for each 9 centimetre field-gun. In each army there is established an army park, which is intended to replenish the whole army with ammunition, fire-arms, and material for all the artillery and artillery establishments of the army.

The army park consists of two divisions: Ammunition and general reserve. The ammunition division consists of as many sections as there are corps in the army, and contains 110 cartridges per gun, 140 rounds for the 8-centimetre horse and 102 for the 9-centimetre field gun. The ammunition division is composed of five echelons, one of which has facilities for transporting half the ammunition, *i. e.*, one-tenth of the entire reserve of the army park.

The general reserve consists of various materials and work-shops and is not divided into echelons. The chief of the army park is at the same time chief of the artillery of the rear of the army. The first echelon of the ammunition division is located at a central railway station; the second echelon, loaded in wagons, stands on the road, between the central station and the base, forming a railway mobile store (*en cas mobile*); the third echelon is stored at the base; the fourth and fifth, in the beginning, are at interior depots, and are moved forward as necessity requires. In case the army is at a considerable distance from the central station, the first echelon may be moved forward and located at the central station.

### III. General Quantity of Ammunition, Mobile and Immobile.—

	Infantry.	Cavalry.	Artillery.		Of Cav. Divisions.	
		Of Corps.	Of Sepa- rate Divi- sions.	Of Corps.		
			8-cent. Horse.	9-Cent. Field.		
On the soldier (in limbers for the artillery) . . . . .	112	36	36	156	145	142
In the regimental train (in caissons for the artillery). . . . .	29	..	14			
Total fighting supply . . . . .	141	36	50	156	145	142
In division parks. . . . .	66	..	..	87	61	....
In corps parks. . . . .	47	..	..	62	52	....
Total in mobile rear establish- ment . . . . .	113	..	..	149	113	....
Total of mobile reserve. . . . .	254	36	50	305	258	142
In the army park (store). . . . .	110	..	..	140	102	140

## COMPARISON OF OTHER ORGANIZATIONS WITH THE RUSSIAN.

*I. Rifle Cartridges.—*

The greater the number of cartridges carried on the soldier the better is he prepared in case of battle. The quantity carried is, however, limited by weight and cannot pass a certain point without radically increasing the soldier's pack. With the diminution of the calibre the weight of the cartridge is diminished and a greater quantity may be carried. When infantry rifles had a calibre of .7 inch the cartridges carried did not exceed 40; with the change to .6 inch calibre, 60 were carried; with the change to .4 inch, 80 were carried; with the introduction of the .3 inch calibre 120–150 may be carried. At the present time European armies are armed with the .3 inch calibre (8 mm.) and the soldier carries in :

	Infantry.	Cavalry.
Germany.....	150	50
Austro-Hungary.....	100*	50
France.....	112	36

Armed with the Berdan .4 inch calibre, the Russian infantry carried 84, and the cavalry 36 cartridges per man. If the same weight of cartridges be carried for the new gun, .3 inch calibre, then infantry will carry 130 and cavalry 57 rounds. If the difference in weight between the 2 rifles (10.8–9.45) 1.35 lbs. be considered, then the infantry should carry 150 cartridges. Germany having a heavier cartridge than Russia has fixed upon 150 as the number for infantry.† This is more than in any other European army because its gun is lighter than any other.

	Calibre in milim.	Weight of car- tridge in grains.	Number of car- tridges carried by an infantry- man.
Germany..... Magazine, 1888..	7.8	27.5	150
Austro-Hungary .Repeating, 1888..	8	29.7	100
France.....Repeating, 1886..	8	29	112
Russia ..... Magazine, 1891..	7.6	25.81	150

The Russian gun has almost the same weight as the German while its cartridge is lighter; this allows the Russian soldier to carry at least as many as the German. The adoption by the principal European powers of the .3 (8 mm.) inch rifle is by no means final. Italy, Roumania and Holland have adopted the 6½ mm. and theoretically it is considered possible, to go as low as 3 mm. With the 6½ mm. gun it is proposed to carry 200 cartridges.

Besides the fixed number of cartridges carried on the soldier, a prescribed number is carried also in the regimental train, as follows :

	Infantry.	Cavalry.
Russia, .4 inch rifles.....	48	18
“ .3 inch rifles.....	76	30
Germany, .3 inch rifles.....	50	10
Austro-Hungary, .3 inch rifles... 42		
France, .3 inch rifles.....	29	14

\* Before beginning battle this number is brought to 120.

† This number has been increased somewhat.



In Russia these are carried in one-horse carts at the rate of 2 carts per company, in Germany and Austria in two-horse wagons at the rate of 1 per company, and in France in four-horse wagons at the rate of 1 per battalion. The Russian supply is the greatest and at the same time the most mobile, the French the smallest and the least mobile. The mobility of regimental cartridge wagons is of great importance for by it they are capable of following the troops going into battle away from roads. The Russian cavalry fighting supply with the adoption of .3 inch calibre will considerably exceed that of other armies, as seen by the following table :

		On the soldier.	In regimental train.	In horse bat- tery train.	Total.
Russia,	.4 inch rifles .....	36	18	..	54
"	.3 " " .....	60	30	..	90
Germany,	.3 " " .....	50	..	10	60
Austria,	.3 " " .....	30	..	..	50
France,	.3 " " .....	36	..	14	50

From this it is seen that only Russian cavalry regiments have cartridge wagons in their train. In the German and French horse battery trains a small supply of cartridges is carried for the cavalry to which they belong.

The fighting supply for infantry is as follows:

		On the soldier.	In regimental train.	Total.
Russia,	.4 inch rifle .....	84	48	132
"	.3 " " .....	150	76	226
Germany,	.3 " " .....	150	50	200
Austria,	.3 " " .....	100	42	142
France,	.3 " " .....	112	29	141

## II. *Artillery Ammunition.*—

The fighting supply for field artillery of the principal armies of Europe is seen by the following table :

	Field.			Horse.		
	Calibre in centim.	Number of caissons per gun.	Fighting supply per gun.	Calibre in centim.	Number of caissons per gun.	Fighting supply per gun.
Russia, battery gun 4.2 inch....	10.67	2	108	..	..	..
" light and horse gun 3.42 inch	8.69	1½	150	8.69	2	130
Germany.....	8.8	1½	148	8.8	1½	148
Austria .....	9	1	128	9	1	118
France ...	9	1½	145	8	1⅓	142

From the above the following may be seen :

A single calibre for field and horse artillery exists only in Austria and Germany. France has one calibre for field artillery but has preserved a special smaller calibre for horse artillery. Russian field artillery has two calibres, the smaller of which is also adapted for horse artillery.

A single calibre for all field artillery is very advantageous by simplifying the supply from the rear ; for in this case any ammunition caisson is capable of supplying any field battery whatsoever. The adoption of one calibre for

field and another for horse is bad ; but it is worse when the field artillery has two calibres, because in the same park it is necessary to have shells of two sizes.

In consequence of the large calibre of the Russian battery gun it requires two caissons, which carry 108 rounds, while  $1\frac{1}{2}$  caissons for the light gun carry 145-150 rounds. In the number of caissons for the light field-guns Austria alone makes an exception, having but one caisson per gun with a supply of 128 rounds. The number of caissons per horse gun in the Russian army is 2 to  $1\frac{1}{2}$ . Although the Russian horse gun has 2 caissons and its calibre is less than that of other guns, still its supply is only 130 charges, while that of the German is 148, and the French 142. This is explained by a desire to give to the horse artillery as great mobility as possible by diminishing the load.\*

### III. *Park or Mobile Rear Reserve.*—

The relative quantity of mobile or park ammunition of European armies is shown in the following table. In it are given data touching only .3 inch rifles and light field-guns because other data are too dissimilar for comparison.

	.3 Inch Infantry Rifle.				Light Field Gun.			
	Division.	Corps.	Army.	Total.	Division.	Corps.	Army.	Total.
Russia....	100	18	..	118	124	17	..	141
Germany..	..	80	..	80	..	126	..	126
Austria...	57	18	26	101	110	..	35	145
France....	60	47	..	113	61	52	..	113

From this it is seen that the quantity of cartridges of mobile parks for Russia and France is almost the same, 113-118 ; Austria has somewhat less, 101 ; Germany has still less, 80 per gun. The composition of the German park is relatively small. In Russia the 4 flying and 1 mobile park (per corps of 2 divisions) have 116 ammunition wagons of six horses each, while in Germany the 4 ammunition columns of the corps have in all 84 ammunition wagons of six horses each. The quantity of shells of the mobile park reserve of different armies varies from 113 to 145. The Russian army compared with the German has a greater park reserve of artillery ammunition, 141 to 126. The composition of Russian parks is relatively great compared with the German, namely : for 64 light corps guns of the former there are, in 4 flying parks, 96 caissons ; and in one mobile park 16—a total of 112 six-horse caissons or nearly 2 per gun. In Germany for the 120 corps guns in the 6 ammunition artillery columns there are in all 120 caissons or 1 caisson per gun. As regards the park reserve of Russian battery (heavy) guns there are, for 32 *battery* corps guns 96 caissons in 4 flying parks, and 12 caissons in 1 mobile park or  $3\frac{1}{3}$  caissons per gun. These caissons carry 161 rounds per gun.

The mobile park reserve is not everywhere distributed in a similar manner ; in Russia and in France there are division and corps reserves ; in Austria besides that there are army reserves, while in Germany there are only corps reserves †

\* A load per horse in Russia is 585 pounds, in Germany 774 pounds, in France 783 pounds, in Austria 792 pounds.

† The park supply of the artillery of a French corps (120 guns) is transported in 183 six-horse caissons (17×6=102 caissons of flying parks and 69÷12=81 of the mobile park) which allows  $1\frac{1}{2}$

## GENERAL RESERVE OF MOBILE SUPPLIES.

	Fighting Supply.	Park Reserve.	Total.
<i>.3 inch Infantry Rifle.—</i>			
Russia.....	226	118	344
Germany.....	200	80	280
Austria.....	142	101	243
France.....	141	113	254
<i>.3 inch Cavalry Rifle.—</i>			
Russia.....	90	18	108
Germany.....	60	60	120
Austria.....	50	53	103
France.....	50	..	50
<i>Light Field-Gun.—</i>			
Russia.....	150	141	291
Germany.....	148	126	274
Austria.....	128	145	273
France.....	145	113	258
<i>Horse Gun.—</i>			
Russia.....	130	17	147
Germany.....	148	135	283
Austria.....	118	141	259
France.....	142	...	142

## IMMOBILE RESERVES AT BASES.

These are established at central and intermediate bases and are: in Russia, *field depots of ammunition* (1st line and intermediate) composed of local parks; in Germany *army parks* established at central railway stations and *central depots of ammunition* established in frontier fortresses; in Austria, *army artillery depots*; in France, *army parks* echeloned along the communicating railway as follows, 1-5 at the central railway station, 1-5 at the base, 1-5 between these two stations in cars forming a mobile railway store, and 2-5 in interior depots.

The general quantity of ammunition in principal depots and at intermediate bases for infantry rifle and light field-guns of these countries is shown below:

	Per Rifle.	Per Gun.
Russia.....	171	250
Germany, (1) at central station.....	20	19
(2) in principal depot.....	?	?
Austria.....	25	130
France, (1) at central station.....	22	20
(2) between the central station and the base.	22	20
(3) at the base.....	22	20
(4) at interior depots.....	44	42

For maintaining communication between the immobile depots and the mobile park supplies the following measures are taken: in Russia all artillery establishments of the rear of the army are in charge of one person—

caissons to the gun. The park supply of the artillery of an Austrian corps (96 guns) is carried in 108 caissons ( $18 \times 2 \times 3 = 108$ ), and besides that in the army park 44 caissons per corps; therefore the entire park mobile reserve, 145 rounds per gun of the 96 guns of the corps, is carried in 152 caissons which give  $1\frac{2}{3}$  caissons per gun.

the chief of army artillery parks. Although the depots of ammunition have no permanent transporting facilities yet hired artillery transports may be formed. For this purpose the transport means of mobile parks and likewise military transports may be employed.

In Germany there is no special officer in charge of artillery establishments of the rear of the army; orders emanate from the inspector of artillery of the army. Army parks have a permanent transporting facility in the form of 10 mobile columns for each park.

In Austria the same may be said of the general supervision of the parks as in Germany. Army depots have no transporting means.

In France the general supervision of artillery establishments of the rear are in the hands of the chief of the army park of the army; he is the chief of the artillery of the rear of the army. The army park has transporting facilities.

#### GENERAL WAR RESERVE.

The manufacture of ammunition is so slow that to reckon upon the preparation of a considerable quantity during war is scarcely possible and therefore the supply required for war should be kept on hand in time of peace. The amount of the general reserve for war is unknown but the mobile supply of a single state is represented by a considerable number, *i. e.*, about 350 cartridges per small arm and about 300 shells per field-gun.

If to this are added the reserves of field depots these numbers will amount to 500, and with the reserve of interior depots they will be still greater.

If these figures be compared with the figures representing the ammunition expended by the Russians in the 1877-78 war then this reserve seems excessive. For the entire campaign, if all infantry divisions of the army be taken into account, the average expenditure per rifle was 47 cartridges; the greatest expenditure of cartridges for the entire campaign was in the 16th infantry division, 158 per rifle; the expenditure of cartridges in rifle brigades was great, an average for the entire campaign of 250 per man. The greatest quantity expended in one battle was in the 13th rifle battalion in the engagement of the 27th and 28th of December, near Sheynove—122 cartridges per rifle. The average expenditure of shells for the entire campaign was 157 per gun. The greatest expenditure for one action was in the 3d battery of the 31st Brigade the 3d of July at the storming of Nicopolis.

This data would indicate that in war a smaller quantity of ammunition would suffice than is maintained in the principal European armies. But no one knows when a war will end and therefore an army should continually have in readiness a full supply of its mobile reserve and of reserve in field depots, *i. e.*, it is necessary to have in complete readiness a much greater supply than will in reality be expended. As the expenditure of ammunition in future battles will be greater than examples of past engagements have shown, the reserve of war time must be considerably increased, especially if we consider that under the present conditions of mobilization and concentration of armies a very great development of military operations must be expected from the very beginning of the campaign, requiring a great expenditure at the outset.



## “HORSE ARTILLERY AND CAVALRY.”

BY MAJOR E. S. MAY, ROYAL HORSE ARTILLERY.

*(From Aldershot Military Society Papers.)*

HAVING in several recent lectures discussed the question as to how artillery may assist cavalry when acting with it independently, it has occurred to me that to-night I should rather dwell on how the two arms may best be turned to account to supplement or support the action of a combined force. It is in this latter rôle that we most often see guns and cavalry utilized at our field days and manœuvres, and on active service we may also anticipate a great extension of the demands which will in this way be made upon them. But in order to thoroughly appreciate the value of horse artillery, it is necessary in the first place to have a clear conception of its nature, and its origin, and therefore, perhaps, before I say any more, I may be allowed to cast a glance backwards to the earlier stages of its existence.

Originally adopted in 1759 by Frederick the Great for employment with his cavalry, the advantages with which mobility endowed field artillery soon caused the arm to be introduced in a far larger degree than its use with horsemen only demanded. Austria followed the lead of Prussia in 1779, France in 1791, when General Matthieu Dumas formed two companies, increased to nine in 1792, and thirty in 1793,\* Russia and England in 1793, the latter with four troops, which had been increased to fourteen at the date of Waterloo. Galloper guns belonging to the Madras artillery had been employed in the second Mysore war of 1790-92, and again in the third Mysore war of 1799. In the year 1800 “an experimental brigade” of two guns was formed in Bengal, and what was termed a battery of horse artillery took part in the operations in Egypt with the Indian contingent (under Sir David Baird). From this time the value of the arm was much appreciated in India, and the number of batteries grew until in 1816 there were six troops permanently organized. Up to this time there were no field batteries, as we understand them, at all. “Guns lived in magazines,” and were taken out as occasion required, and were manœuvred either by men on foot with drag ropes, or by bullocks. How vast was the difference in those early days between such batteries and the others of the horse artillery which possessed as much mobility as perhaps do any of to-day, is at once apparent, and accounts for the great preference shown for horse artillery by the generals who conducted our numerous campaigns in India in the early part of the century.

In Europe, during the wars of the French Republic, field batteries were but little more mobile, and we find Napoleon using horse artillery to a very

\* The reputation of the horse artillery was extremely high in the French army at the period of its first introduction. General Foy, “*Histoire de la guerre de la Péninsule*,” Paris, 1827, says: “The horse artillery at its creation was composed of the most active artillerymen, and was afterwards recruited from the best grenadiers. It performed marvels; in the campaigns in Germany simple captains in this arm acquired a reputation throughout the whole army. Generals soon wished to have no other artillery, because this being lighter and more efficacious, less of it was required, and the length of the columns on this was proportionately shortened.”

large extent therefore, while in the Prussian service also its proportion to field artillery was very high. As technical improvements were brought about in the manufacture of matériel, and the weight behind the teams in field batteries was lessened, the difference between the two types grew smaller and smaller, until in 1870 it became a question whether there was any need to organize a special horse artillery at all. Any such ideas were, however, dispelled by the experiences of the campaign in France of that year, and a demand arose at its close for more rather than fewer such batteries. In 1874 the Austrians, who had discarded it, carried out a series of experiments at Totis, and in consequence of what they learnt, reintroduced the arm, and at the present moment, when we want to develop fire effect, and yet not increase the burdens of the horses, the mounting of gun detachments, or of part of them, is simply a matter of money. Everybody would wish to do so, but considerations as regards expense prevent its being done; because the value, or rather necessity, which mobility is to field artillery is the lesson which all practical work, whether it be on active service, or at Aldershot, or at Okehampton, seems to point out. For short distances or on level ground guns, with four or five men seated upon them and their limbers, appear to get along capitally; so they do, but weight tells surely when anything of a strain is felt. And it is also of great benefit to have men as gunners who are of powerful physique, such as those who wear the jacket in our service. The gunners in field batteries are in these days not of adequate stature, and those who speak of running guns into position by hand do not realize how arduous such an operation under existing conditions would be. It is not the least advantage which horse artillery possesses that it can rely on stronger men to man its guns than can our batteries of field artillery, and under the strain of active service this would soon be discovered. It is for these reasons that a practical soldier, like the late Prince Kraft, recorded his opinion that all the corps artillery should be composed of horse artillery batteries; and it is for the same reason that the cavalry divisions abroad now want to have batteries as an inseparable part of their unit. Otherwise, the experience of 1870 has told them that this adjunct will be continually in use away from them.

I happened last summer to receive a most excellent demonstration of the difference the equipment of a horse and field battery makes, and it comes in so appropriately here, that perhaps you will let me read you the letter which gave me an account of it. The writer of it (he belonged to the Honorable Artillery Company) said: "You may perhaps know that we have a battery of horse as well as a battery of field artillery, and that they are drilled together as a brigade division. We went out last Friday week to the Long Valley for drill, and drilled at a steady trot, forming line from column, column from line, and wheeling into battery columns, and into line, etc., etc. I had not been paying much attention to the horses themselves, when certainly within an hour of our arrival in the valley, the veterinary officer of the field battery came up and said that the division must be halted for a bit as the horses of the field battery were blowing. The batteries were at once halted, and there is no doubt that the field battery horses were considerably distressed, whereas those of the horse artillery were as fresh as paint.

All conditions were similar, *i. e.*, equipment (9-pr. R. M. L., without any ammunition); same stamp of horse (all from T——, the same class he sends to the Fire Brigade); horses in similar condition; same skill in the drivers; the only thing different being the five gunners on the gun and limber in the field artillery, the horse artillery of course having none. In the service one is always in a brigade division, either all horse artillery or all field; therefore a direct comparison during similar movements would very rarely occur. There had been a little rain, and the Long Valley was heavy going, no doubt; but still I noticed on the road to Aldershot that the field battery did not seem to travel so well, though we did not march very fast; twelve miles in two hours being by far the fastest bit. My own idea had always been that of course horse artillery could keep going much longer than field artillery, but I had never imagined that the field artillery would have shown signals of distress as soon as it did. I have mentioned this to one or two officers of the regiment who have also expressed surprise."

I think that the last paragraph, just quoted, justifies my again accentuating a point on which men who have had much experience, I do not believe, have any doubt whatever.

I could quote similar examples from the records of active service, both of our own armies and of foreign ones, but I do not think I need further dwell on this particular point now, except perhaps to say that we do not very often want rushes over short spaces at a gallop from horse artillery; on an emergency we may need them, and probably will, but it is practice in getting over extremely long distances at a steady unbroken pace that is so valuable; the power to make quick forced marches which, Prince Kraft says, the Prussians learnt the necessity for, and practised after the campaign of 1866. And he also tells us from his personal experience that, "in order to come into action in time when moving from Rettendorf by Königinhof and Chotieborek, to a point south of Jericek, I had to trot 14 (English) miles in a hilly country; and even this as far as one can see will not always be enough in the future." Again he says (6th letter) that "forced marches were the rule in 1870," and quotes the experiences of the 1st horse artillery battery of the Guard, which marched on the 13th of August from Bermering by Oron to Dieulouard, a distance of 32 English miles. At Vionville the horse artillery brigade of the 3d corps marched seven miles in three-quarters of an hour over hilly and narrow stony roads. The field batteries took just double the time to do the same distance. At Beaune-la-Rolande again it marched 31 miles on to the field of battle.

But even on what may be termed the battle-field itself greater demands than formerly will be made on horse artillery. Distances will be greater than they used to be, and moreover there will in all probability be a marked difference in the manner in which a final effort to drive an attack home will be made. Formerly the reserve artillery possessed the heaviest metal, and it came up late in the fight, and was often concentrated against the point of assault, which was assailed directly from the front. A modern battle will partake more of the nature of an envelopment on a wide front, and unless accompanied by a flank attack, it will in the face of the retaining power of modern fire-arms scarcely be possible to turn an enemy out of his position

by a direct assault. It appears to me that any batteries which have been held in reserve will be sent on wide turning movements, and that the duty of carrying these out will fall naturally to the most mobile portion of an army.

There are, therefore, three rôles in which for the future horse artillery may be employed :

1. As an adjunct to the cavalry brigade or division in reconnaissance work, in pursuits, in retreats, or in an independent cavalry combat, fighting at decisive ranges.

2. As field artillery of a special mobility for use as corps artillery.

3. And, finally, when on occasions it may become the most important part of the cavalry brigade or division, when this is sent to make wide turning movements during the progress of a battle.

As regards the duties of guns during a purely cavalry combat, I do not want to refer to myself, but much has been said on that point in previous lectures ; for that reason, and also because it is best, perhaps, not to dogmatize as to the tactics to be adopted in it, I will only briefly touch upon it now. It is the spirit rather than the letter of anything like rules which should guide men in actions where guns and horsemen act together as an independent force. We must try and work on a system, and the cavalry leader must have a clear scheme of action in his mind ; but the best laid plot may suddenly have to be modified, and the broad principle is that the guns must aid the cavalry when and where they can. The *how* must sometimes be left to the circumstances of the moment, and after the first movements the gunner must often act on his own judgment, and not expect to receive further instructions.

One great thing to remember is that the enemy's squadrons are what we want to destroy, if we do that we can have his guns too, for they will hardly get away before our victorious pursuit. I know that I am here at variance with Prince Kraft, and his authority is to be respected. He says that the enemy's guns are first to be destroyed, and that when they have been accounted for it is time enough to turn attention to the cavalry. Such views are, however, in my opinion largely influenced by those which govern the action of artillery in an ordinary engagement, and are dictated by a mistaken valuation of the powers of guns in a short and fleeting combat. There would rarely or never be time, when the decisive crisis of the fight came, to engage more than one target, and then, at that supreme moment, even if you have half your guns temporarily out of action, perhaps through losses amongst the teams because you have made a bold advance, still, if the remainder can get a few shrapnel at a very decisive range into the enemy's squadrons, I am convinced the effect upon them will be so great that some sacrifice, should it be involved, will be justified.

On the other hand, if we are to judge by what has before now often been seen at manœuvres, should the two artilleries engage one another at comparatively long ranges, and be drawn into an artillery duel, the cavalry will fight their battle out quite independently of the guns, and there will be little or no coöperation between the two arms. And another great general principle should be kept in mind by artillery officers in this nature



of combat, and that is, that they must never, if they can help it, let their guns get into such a situation that the cavalry will have to make a sacrifice to extricate them. Few cavalry officers, in the heat and excitement of an action, and especially a rear-guard action, will send orders to the guns to move. They will have to conform to the progress of the fight, and the officer who leads them must not wait for orders after he has once unlimbered.

Nor do I need to remind you again to-night of what assistance guns may be to the cavalry working in advance of armies. I have previously dwelt a good deal on that point also, and a very few instances from the Franco-German War will in themselves be enough to convince even the most sceptical. The mere appearance of a horse artillery battery was enough on many an occasion to cause the hostile cavalry to withdraw. When Von Redern was reconnoitring with his brigade on August 15th towards Xonville, he came across Prince Murat's brigade belonging to Forton's cavalry division, the flankers of which skirmished for a little, but when a German horse battery was brought up, the brigade retired, and let the Germans come on, and see Forton's cavalry division halting near Mars-la-Tour. There were twelve guns with it too, which might have been turned to some account.

Again at Buzancy, the regiments of Brahaut's cavalry division refused to face the Saxon squadrons who were looking for the French army, because they had no guns to oppose the battery which was brought into action against them, and the consequence of that error on the part of the French led up directly to the surprise and defeat at Beaumont.

It is indeed in reconnaissance work ahead of the main army that horse artillery will, I believe, be quite indispensable. Nothing more effectually searches cover than a few shell, and they can force many an obstruction that might be held for a long time against cavalry alone.

I will not, however, to-night dwell long here; nor as regards the employment of horse artillery under the artillery commander as corps artillery pure and simple, is there, either, any necessity for me to enlarge. The guns are then turned to account when and where they may be most needed; and they are valuable because their mobility may at critical moments enable them to accomplish feats in getting into position in the shortest possible time beyond the powers of field batteries, or to do so over ground which might unduly tax the powers of less active units.

But on the third rôle there is much to be said which I think will be interesting, because the necessities of the day seem to here offer to cavalry and guns once more a sphere of usefulness in which they have before been largely turned to good account, and the great range and effect of modern shrapnel have confronted generals with difficulties which were not formerly experienced when forming a plan of attack.

If we consider what the course of a modern battle is likely to be, we can scarcely fail to be struck with the increased resisting power with which improvements in fire-arms have endowed the defense. Even in 1870 the character of a battle had grown to be of the nature of a long drawn out effort on the part of the attack to weary out and bear down by sheer weight

of numbers and persistence the stubbornness of the defence. Fire-arms, and especially those of the artillery, have improved vastly during the last twenty-five years, and to force the enemy's line by a frontal attack, seems, as I have said, on paper at any rate, an extremely arduous enterprise. Positions will, however, have to be carried, and will no doubt be carried, just as they have been before, even in spite of the most appalling losses; but every effort should be made to reduce the sacrifices involved to a minimum, and to let skill in manœuvring replace or supplement brute force.

Flank attacks have ever been employed when possible by every skilful leader, and in these days they will have to be resorted to when the ground is at all favorable. But the space occupied by troops now-a-days is so great that to move round an enemy's flank is no longer so feasible a manœuvre as it was. In doing so it is to be remembered that you also lend your flank to assault, and that unless the turning movement be carried out beyond striking distance of the foe, he may spring upon you in the act, just as Frederick did on the allies at Rossbach, or Wellington did on Thomière's division at Salamanca, or as Napoleon smote the Russians at Austerlitz. You must be able to strike very swiftly and opportunely if success is to reward you; the swoop on the flank should come simultaneously, if possible, with one from the front, and to effect such an union of force you must either surprise your foe completely, or you must forestall him by rapidity of movement.

Now, to keep out of reach of modern shrapnel means that your columns must move on a very wide arc. Not only that, but should circumstances suddenly alter, and it become expedient to abandon the enterprise, you should be able to draw your hand out of the fire ere it is destroyed. In other words, any general who in the future attempts either a serious flank attack, or such a powerful demonstration as shall influence his opponent's scheme, must be able to utilize troops possessed at one and the same time of great fire effect and immense mobility. Now, horse artillery batteries in conjunction with a powerful force of cavalry, supported too by mounted infantry, will supply him with the very tool he needs for his purpose.

And when such an employment of horse artillery is suggested I would remind you that it is only a revival of former tactics which is recommended. Napoleon habitually used cavalry and horse artillery in this very way. The campaign of 1814 will furnish several excellent illustrations.

At Rheims he turned the Russian left with 8000 horsemen supported by 30 horse-artillery guns. When Blücher, defeated at Vauchamps on the 14th February, 1814, was falling back by Etoges on Châlons, Napoleon endeavored to destroy him by a wide turning movement made with Grouchy's cuirassier division and its two horse artillery batteries. No one who reads the account can fail to see that the Prussians only escaped complete annihilation by the steadfastness of their infantry, and that they would have been unable to withstand the inundation of cavalry had guns been present to supplement the efforts of the horsemen; all the accounts admit this, and the Germans were frankly grateful for the good fortune which befriended them. The weather in the winter of 1814 was, however, very bad; the

fields, and even the roads, were deep in mud and snow, and almost impassable. The two horse artillery batteries that were intended to act with Grouchy got bogged, had to be left behind, and were unable to take their share in Napoleon's stroke. The infantry formed solid squares, which they could not have kept intact under the showers of case which the tactics of the time would have called forth upon them from the guns. Thus, though Grouchy brought nearly 100 squadrons to bear, Blucher managed to make good his retreat, and, although beaten, was able to reform his troops for another effort. Who will say that such a great flank attack by masses of cavalry on a retreating foe may not be perfectly feasible in the future, and bring the vast results with it that it has done before in military history? The fire of the guns will indeed be even more valuable than it used to be, for they can produce their effect from greater distances and over wider spaces than was formerly the case.

But an even better example may be culled from the annals of the year before, and the achievement of Murat at Dresden, on the 27th August, 1813. Napoleon was then also at bay before a vast preponderance of foes, and all his ingenuity was required to equalize the scales. That was a time of rain and mud too, and guns could scarcely be too light if they were to move with cavalry. Therefore the great Emperor double-horsed them with teams from the commissariat wagons, and he sent Murat with 10,000 sabres and six batteries of horse artillery to envelop and destroy the allied left. So well did that brilliant leader of horse perform his task that he killed and wounded 4000 men, and took 12,000 prisoners. I know the day was wet, and that the infantry could not use their muskets, but that was the fortune of war, and the performance was a great one all the same. The horse artillery batteries worked well with Murat's squadrons too, and we read how they followed up the beaten foe, and coming into action from hill to hill poured a destructive fire on their opponents, whose chiefs had not supported them, as they should have done, with guns.

There are lessons, I think, to be learnt from these old battles. The method by which the force was applied was different; ranges were short, and *mitraille* was used in place of shrapnel, but the principle which underlay the tactics is an universal one, and I do not believe that it is any extravagant notion to regard it as an influence which is still potent.

Indeed I shall presently show you the Germans in 1870 armed with modern weapons, and facing opponents equipped with a rifle but little inferior to our own of to-day, utilizing their cavalry and horse artillery for just the same purpose as Napoleon used his at Dresden, as Soult used his at Albuhera, and as ours was turned to account on the defensive at the same battle.

It is especially interesting to us to study defensive tactics, because they have been the methods we have so often relied upon, owing to the circumstances under which we have fought on the continent. Now, the soul of the defense resides in an opportune counter-attack, and it is on the flanks of the attack that such a blow may most effectively be dealt. It is because they were defensive battles fought against widely superior odds that I am particularly glad, therefore, to refer to two from the campaign of 1870, and

because also we may gather some most instructive and striking examples as to the use of cavalry and horse artillery on the field of battle from them.

At Beaune-la-Rolande (28th November), according to the official account, 11,000 Germans with 70 guns were called upon to ward off the endeavor, inspired by Gambetta, of 60,000 Frenchmen and 138 guns to advance to the relief of Paris. Under the strain of such an unequal struggle we shall find artillery again and again called upon to make immense exertions, you will read of batteries asked to show great mobility, and we shall find guns when men and horses were wounded having to be abandoned because they were stuck fast in the soft ground. You may there see cases in which the superior mobility of horse artillery was of vast service, and you will glean instances of the guns and cavalry striking more than one opportune blow.

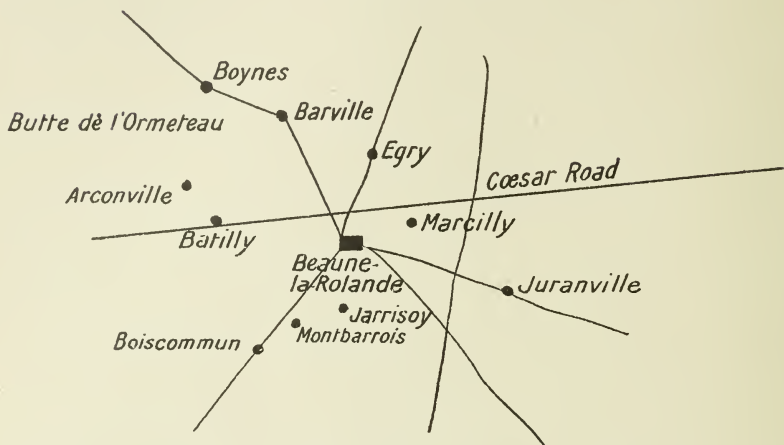
Early in the battle Beaune would have been captured by the French but that Major Körber led up the two horse artillery batteries of the 10th Corps from Marcilly in the nick of time to the east of Beaune, and taking the French infantry in flank at 800 yards, brought its advance to a standstill. On the left flank the French had also to suspend their advance, as they were suddenly threatened there by the 1st cavalry division. The latter had been assembled at Boynes shortly after the commencement of the action, and at 12 o'clock, in accordance with a summons from General Voigts-Rhetz, had advanced to the Butte de l'Ormeteau. The horse artillery battery, escorted by two squadrons of the 4th Lancers, which hastened forward in that direction, had, shortly after 1 o'clock, opened fire upon the enemy's columns which appeared between Batilly and Arconville, and afterwards from a position further south, upon the masses of troops marching along the Cæsar road. We need not pursue our story of the day further now, but no one who follows it out carefully in the official account will fail to note what a day of storm and stress it was, and how well all the special characteristics of infantry, cavalry, and artillery were in turn turned to account.

Beaune-la-Rolande, and the other battle I want to speak of to-day, are not so celebrated in this country as are some such as Vionville, and Gravelotte, and Woerth, which are in everybody's mouth and figure in every examination paper, but they are regarded by the Germans as struggles which may rank with even the great triumphs I have named, and they will repay study and attention on the part of officers. Loigny-Poupry is indeed quite one of the most dramatic and interesting battles of history, and valuable deductions in almost every sphere of tactics can be drawn from it. Just now, however, we will look into it more with a view to horse artillery and cavalry action than anything, and our notice must be but a brief one.

On the 2d December, General von der Tann with the 1st Bavarian corps was at La Maladerie facing south-west. On the previous day he had been assailed by the French in their effort to reach and relieve Paris, at about 3 o'clock in the afternoon, and his 1st, 2d, and 4th brigades had been heavily engaged, and had lost in the short fight of rather less than two hours which had ensued, 37 officers and 698 men killed and wounded, and 5 officers and 196 men missing. They had been unable to stem the onslaught in greatly superior numbers of their opponents, but had fought with great bravery



## BATTLE OF BEAUNE - LA - ROLANDE,

28<sup>th</sup> November, 1870.

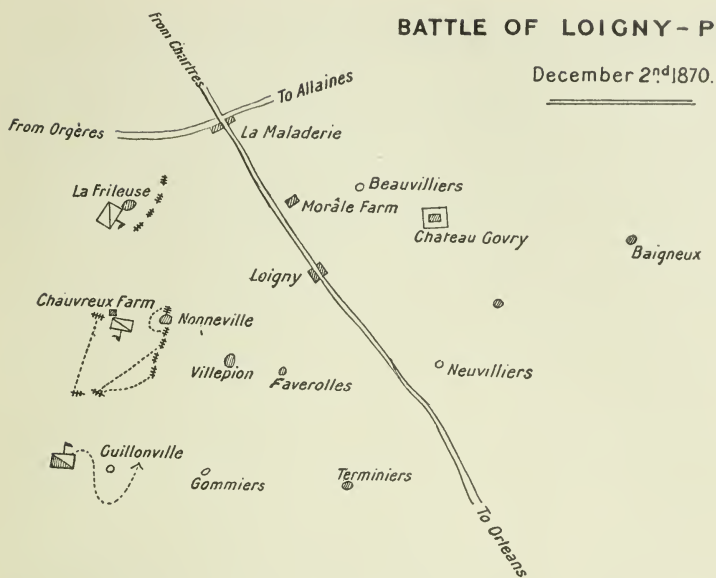
and determination an uphill fight, which, however, is, as Villepion, to be recorded as an undoubted French success. The night of the 1st was intensely cold, and many of the German units suffered very severely from exposure, as they had been obliged to bivouac owing to the proximity of the enemy, while it did not add to their comfort that they had no cooked rations, in consequence of the wagons which carried them having gone astray. The French, too, were not only in superior numbers on the 2d, but they were in unusually good heart, having just won the battles of Coulmiers and Villepion. This circumstance should be taken into consideration in estimating the German performances which I am about to describe, and goes some way, at any rate, to decrease the advantage which their trained soldiers had over the raw levies which opposed them.

I may add that the country in which operations were taking place was generally level, broken by gentle undulations, but furnishing little cover of any sort; the fields were highly cultivated but were unfenced, and the sharp frost had rendered the soil hard and favorable to movement.

About 8 o'clock the German outposts could see that the French 16th Corps was again pushing on in full force, and Von der Tann received orders from the Grand Duke to take up a position between Beauvilliers and Chateau Goury, with his left resting on the latter place. He was informed that the 4th cavalry division would protect his right flank, while the 17th infantry division was moving on Lumeau and the 22d on Baigneaux to his assistance; but when in accordance with these instructions he was in the act of taking ground to his left, he was assailed before his movement was completed, and his 2d division had to be deployed and was in action at about 9:30 o'clock between Beauvilliers farm and Chateau Goury.

With reference to this particular part of the contest, it is enough to say

## BATTLE OF LOIGNY-POUPRY.

December 2<sup>nd</sup> 1870.

now that the fight surged to and fro for some time with varying success. The French at first pressed on very triumphantly, but a brilliant counter-attack by the 3d Bavarian brigade brought their advance to a standstill, and eventually forced them back in some disorder as far as Loigny. The whole French 16th Corps was now, however, deployed on the line Neuville-Nonneville, and as it came on the Bavarian brigade was forced to fall back with very heavy loss. The fight is chiefly remarkable for the part played in it by the German artillery; six batteries, in the first phases of it, formed a solid framework for the 2d Division to deploy on, and enabled it to rally against the powerful French assault. Later the batteries again stemmed the rush of the second French advance, and faced the hostile skirmishers while their comrades rallied behind the guns. Eventually the guns too had to fall back to a second position, but being reinforced thereby by two batteries from the reserve artillery, were enabled once more to make a stand and cover the infantry while it was being reformed.

The position of affairs was, however, a critical one for the Germans, and the French right was making a vigorous attack on the west side of Chateau Gouvy, while their centre seemed about to pierce the German position between it and Beauvilliers; but General von Tresckow, who commanded the 17th Division, now received word of the state of affairs at Chateau Gouvy, and he acted with a true instinct. He ordered Colonel von Kahlen of the 17th Dragoons to take his regiment and two horse artillery batteries\* and to trot on ahead in order to lend what assistance he might to the Bavarians. Colonel von Kahlen sent one squadron to Lumeau and with the other three and the two batteries, at 10:30 o'clock, reached a point south of Chateau Gouvy, from which he was enabled to open fire unexpect-

\* These batteries had only, however, 10 guns between them.

edly on the right flank of the French division (Barry). This artillery attack had the very best results. The Bavarians were extremely hardly pressed at the moment when the batteries were unlimbered, and the surprise and confusion created by the sudden storm of shells which they poured upon the French enabled the 3d Brigade to extricate itself and fall back.\* Two squadrons were now sent away from the batteries to endeavor to establish communication with the 22d Division on the east of Lumeau, and one remained with them as escort. The French attacks on both flanks came to a standstill soon afterwards. I think the timely appearance of these squadrons and batteries furnishes us with a most interesting example, and well displays the value of a bold flank attack by cavalry and horse artillery. I must, however, now leave this portion of the battle-field in order to speak of events which will have an even greater interest for us this evening. Before quitting it, however, perhaps I may be allowed to mention an extraordinary proof of the efficacy of artillery fire, and an event, perhaps, unique in the annals of war which occurred when the eighth heavy battery of the 3d artillery regiment was assailed from both sides of Morâle farm by hostile infantry, and was able to repulse the attack solely by its own fire. When the battery subsequently moved forward it came on a vast heap of corpses, the evidence of its fire effect. Beneath one of them was found the color of the 41st French regiment, which the battery took possession of, and the trophy hangs to-day in the Royal Bavarian Army Museum at Munich as a memorial of its achievement.

But to return to something more relevant to our subject this evening.

The 4th cavalry division had been occupied since dawn in reconnoitring on the French left flank, and the Brigade Krosigk had been successfully engaged with the enemy, but had eventually fallen back before superior numbers.

The two horse artillery batteries belonging to the division had come into action at 10:30 against French artillery at Morâle farm, which they speedily caused to retire, and then advanced at a gallop to within 700 yards of French infantry, which they engaged. At 11:30 Prince Albert, who commanded the 4th cavalry division, received an order to take the Bavarian cuirassier brigade with his division, and to make a turning movement against the French left.

The two horse artillery batteries were now brought into action south of La Maladerie under the escort of one squadron, in a position where they were enabled to strike the flank of the French advance between Morâle Farm and Loigny. They were soon joined by two horse artillery batteries belonging to the Bavarian cuirassier brigade, who came into action to the west of La Maladerie, and from that position their fire, which was directed upon the swarms of French skirmishers along the road from La Maladerie to Loigny, and at Morâle Farm (1000 and 2000 metres distant respectively) was most effective, and assisted the Bavarian infantry very materially.

Meanwhile the 4th cavalry division had united itself together at La Fri-leuse, and remained there till about 2 o'clock.

About this time Prince Albert determined on a very bold and wide

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\* These two batteries fired 476 and 720 shells respectively during the battle.

turning movement, directed against the left flank and rear of the French, and moved the division at a trot towards Nonneville. When he reached the south of Nonneville he discovered the columns of march of the 17th French corps moving on Terminiers from the south to support the 16th. Prince Albert wheeled two brigades to face these columns, while the 3d Brigade (Krosigk's) preserved the former direction and moved on Guillonville. But the French batteries of the 17th Corps now came into action and fired on the division, and its advanced parties were fired upon also by French infantry near Gommiers.

To attack infantry which had not been at all engaged as yet would have been a useless expenditure of life, and Prince Albert recognizing that the moment was not opportune for attack drew his division back to Chauvreux Farm. Meanwhile one of his horse artillery batteries\* came into action on the north-west of Nonneville, and engaged a French battery which had moved into position close to a windmill to the north of Villepion. Two Bavarian horse artillery batteries also hurried up across country at a rapid trot from where they had been in action near La Maladerie, came into action on the other side of Nonneville, and supported it. Their combined fire soon drove off the French guns, and then the battery on the north of Nonneville joined the two on the south, and turned their fire on to some French batteries near Faverolles. These they drove away, and thus began to shell the village of Faverolles and the French infantry posted near it. A squadron of uhlans was left with these three batteries as an escort. The other horse artillery battery† belonging to the 4th cavalry division had meanwhile accompanied Prince Albert to Chauvreux Farm, and remained there with the division.

Towards 3 o'clock several French cavalry regiments showed themselves on the west of Guillonville. The horse artillery battery from Chauvreux Farm at once galloped out to meet the new danger, and came into action "at a decisive range" against them. Its fellow battery, having observed the French advance, also moved rapidly to its support, and engaged the hostile squadrons at a range of 1200 metres. These quickly had enough of the contest, however, and beat a retreat.

Just now, too, another attempt was made by the French cavalry to advance from the other side of Guillonville, but they were received by such a storm of shells from the two batteries that they fled precipitately, *davon-jagten* is the German word. Indeed, we read that so headlong was their flight that the ten German cuirassier squadrons which had moved up to charge them could never catch them up. Finally the French squadrons rallied behind their infantry at Gommiers, and the German pursuing horsemen had to let their prey escape.

The uhlan brigade of the division had meanwhile struck upon some French infantry, which had been thrown into great confusion by the artillery fire, and captured 200 prisoners. Several other encounters between smaller bodies of the brigade also took place, but in every instance the French cavalry refused to face their opponents, and it was only the in-

\* The 1st horse artillery battery of the 5th artillery regiment.

† 2d of the 11th artillery regiment.



fantry fire from buildings and villages which held the German inroad back.

One word more may be added as to the horse artillery.

The two batteries, which had so gallantly driven off the French cavalry, soon afterwards went further forward, and engaged some French batteries which had come up on the south of Faverolles. They were joined by one of the two Bavarian horse artillery batteries, and the other was left alone in its original position.

We have now to record a German failure, and we have a lesson as to the error of breaking up a brigade division. A French battery was facing this one, but as it seemed to be at too great a range it was not considered dangerous. When the Bavarian horse battery was left alone, however, the despised French battery, as though to vindicate the power of artillery, opened so rapid and accurate a fire that, in spite of the great range, it completely surprised its opponent and compelled it to limber up and retire.

Now I think that amongst these incidents thus briefly related we have very striking examples of what horse artillery and cavalry may accomplish during the course of a great battle. Prince Albert showed the greatest judgment and skill in the way in which he threw the weight of his command into the scale, and the onslaught he made on the French flank and rear had the most pronounced effect.

The German horse artillery batteries\* have also received the highest praise for their conduct on this day, and their intervention materially affected the course of the battle. For, under the menace of their shells the tide of the French advance was brought to a standstill, while the immediate evidence of their prowess lies in the fact that the 3d Division of the French 17th Corps was deployed to meet their flank attack, and was left behind to guard the left flank while the loudest cries were going up towards Loigny for its aid. We are concerned only now with horse artillery and cavalry, or I could tell you much more of this most interesting and instructive of fights, but I hope I have said enough to show you how potent and valuable a factor in a modern battle the mobility of cavalry and horse artillery may prove to be.

In this battle 28,000 German rifles, 6200 sabres, and 196 guns opposed 87,300 French rifles, 5600 sabres, and 264 guns, and captured 2500 unwounded prisoners, 8 guns, a mitrailleuse, and a color.

On the German side, the proportion of guns to other troops was 5.73 per 1000 men; while the defeated had only 2.84 guns to the same number.

Examples to illustrate almost every feature of warfare can be culled from this battle, but there is no time now to deal with all of them. One, however, my friends of the cavalry will like to hear of, and perhaps you will spare me a moment to mention it.

When the French infantry were being driven back at about half-past twelve, by the advance of the German 22d Division, a 12-pdr. battery of the reserve artillery of the 16th Corps tried to come into action near Neuville-sur-Aisne to cover their retreat. Captain von Marschall, who had ridden on about

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\*The two horse artillery batteries belonging to the 4th cavalry division fired 900 shells between them during the battle.

500 paces in front of his squadron (the 2d of the 11th Uhlans), observed its movement, but thought at first it was a column of wagons. He, however, signalled to his squadron to come to him, and placed it in concealment. When the French carriages came nearer, and it was seen that they were certainly guns, the squadron rushed out suddenly upon their flank just as they were coming into action. So quickly and skilfully was the surprise effected that not one single round was fired by the battery, and the whole of it was captured. That is to say one officer, 76 men, 77 horses, 6 guns, and 8 wagons fell into the hands of the Germans without a shot being expended in self-defense. It is an achievement fit to rank with Tobitschau, and should, like that brilliant example, encourage cavalry officers to endeavor, by means of turning cover, and taking the lie of the ground to account, to surprise artillery, and accomplish great results with little or perhaps no loss.

To-night, however, I have no time left to discuss interesting phases of cavalry and horse artillery tactics, suggested by such an incident, and I must pass on to make a few deductions from the examples which I have quoted this evening.

I hope I have made good my contention, and that I have shown how the teaching of military history will bear me out, when I suggest that our cavalry and horse artillery should, on the battle-fields of the future, devote their attention to the enemy's flanks, to make powerful demonstrations, or even auxiliary attacks, when we are the assailants, and to be in readiness to fall on the hostile line of retreat should we win our way forward. When, on the other hand, we await the enemy's assault, the same arms should secure us from similar enterprises on his part, threaten the flanks of his advance, or even deal a swift and opportune stroke, such as may pave the way to an important counter-attack.

It may be asked whether a cavalry division with two or three horse artillery batteries would be a sufficiently powerful force to produce much impression on the enemy in the manner suggested. My answer here is that what has happened before will happen again, and that as the modern horse artillery gun is so powerful that it can produce a very pronounced effect at 2500 yards at any rate, the chances in future will be more in our favor than they were in the past.

For, at such a distance as I have indicated, it will not be easy for an enemy to estimate the exact strength of the turning force, and, as I would suggest that the cavalry fight when necessary on foot, it will not be easy for him either to correctly analyze the exact composition of the force. I believe the effect of such a counter-attack as I have in mind would be very great indeed, and we must remember that a British cavalry division will have a battalion of mounted infantrymen with it also. These, it seems to me, would form a very valuable escort to both cavalry and guns, and would insure their safety from any efforts against them made by hostile riflemen. I believe, in fact, that there are great possibilities and opportunities here for mounted infantry, and that through their aid a very mobile force, composed of the three arms, may in the future accomplish a very great deal by working together in the manner I have foreshadowed.

An interesting question may be raised as to whether it is not desirable,

therefore, that horse artillery should form an inseparable portion of the cavalry division, and should not be taken away and absorbed in the general fight during a pitched battle. I believe both cavalry and horse artillery officers would welcome such an arrangement, and in Germany, I understand, it is now decided that it shall be so. But in Germany they have a very powerful artillery, and can perhaps afford to leave some batteries idle for a time at any rate. In England, on the other hand, we are very weak in artillery, and even our newest organization only gives an army corps 102 guns with which to fight 120 which a German or French corps has with it. In the face of such a disparity I cannot help thinking that the batteries will be called from the cavalry division, and placed in line to counterbalance the foreign preponderance. As a mere question of tactics it would, I believe, be usually best to leave the guns to the cavalry entirely, but circumstances, as I have said, may be too strong for a British general, and he may have to call up guns from wherever he can get them. And, therefore until the Government supplies us with more field artillery, I doubt whether a state of things which we would all desire can be brought about.

None the less we must hope that the horse artillery will sometimes, at any rate, be forced to work with the cavalry division in the manner I have suggested, and will accomplish perhaps more in that way than if placed alongside the remaining batteries of the army corps.

And this brings me to another point. I have said before, and say again now, that when guns and cavalry are working together independently, the cavalry is the principal arm, and the batteries are a mere auxiliary to it. That is quite the truth, I believe; but in this particular rôle which I have been discussing, it will be noticed that I have somewhat reversed the relative importance of the two arms, and have suggested that in these enveloping movements the principal effect is to be sought from the fire of artillery, while the principal duty of the cavalry will be to guard its safety. The enemy's squadrons may offer a tempting objective very possibly, but his infantry at the stage of the battle which I have in mind will be still unshaken, and it will be better to bring them to a standstill by means of shrapnel fire than to sacrifice a valuable arm, unless there is some crying necessity for doing so.

I wish, however, to guard myself carefully against being misunderstood. I do not suggest that squadrons are to refrain from utilizing their powers in their true rôle, that of shock, should an opening come to them. If it can succeed in gaining the exposed flank of an infantry attack and surprising it, a charge well executed by a cavalry division might have the most far-reaching consequences; but we cannot count on surprises, and should none be feasible, then we must fall back on the effect of fire, and bring the foe to a standstill by shells and bullets. To enable guns to settle down to a deliberate cannonade it will be necessary to secure their flanks and rear, and the duty of safeguarding them will become a paramount one, and must be left to their brethren of the cavalry and mounted infantry. But there is surely as honorable a field here for coöperation between us all as there is in the more exciting and rapidly moving incidents of a purely cavalry action? On one occasion the guns should play into the hands of the squad-

rons, in the other, the anxiety of the squadrons should be for the guns. In the one case we seek to produce our effect chiefly by shock, in the other chiefly by fire. But in each and every case we work together to help one another, and with but one end in view—the most complete and rapid destruction of our opponent. And that the way to such success is paved by a genial coöperation is the lesson I would wish to inculcate. It is only by the most complete coöperation that we can hope to fully accomplish even a small part of the duties that fall to cavalry and guns, but, given a clear, mutual understanding between us, there lies an almost immeasurable field of usefulness before our arms. If this evening I have succeeded in at all adding to the chances of such an understanding, and such coöperation, I shall feel completely satisfied.

#### DISCUSSION.

Major-General E. A. WOOD, C.B. :—I feel myself in rather an invidious position here to-night as being the only cavalry officer present holding the rank of general. I have very little to say to the admirable lecture to which we have just listened. It has certainly opened out a great many points which may lead to a searching discussion of much importance. There is one thing I could not help noticing, and that is where our lecturer led us to believe that in reconnaissance the artillery are more or less in a defensive position, and on that point I cannot help agreeing with him altogether. The artillery must be the pivot on which the cavalry moves, and I should like him to tell us in what way. The lecturer spoke about squadrons being the target for guns instead of the hostile artillery, but much of this must be guided by chance. I fancy that in reconnaissance the artillery on either side will not commence the combat. Their object will be to conceal themselves; but when they do open fire, on what portion of the cavalry will it be? It can hardly be the first line. Would they have time to take the range? The advance is very rapid, and they would hardly have long enough time to get in an effective fire. It will be more likely to be on the hostile supports and reserves as they emerge from close formations; and in the event of the attacking cavalry being successful, they will then have but a small rôle to play, as they cannot change their position in time to coöperate in the movement. On the other hand, should we be driven back by hostile fire, then the artillery will have to sacrifice themselves to let the cavalry get away. Therefore, in reconnaissance the artillery will be more or less on the defensive. As regards turning movements the lecturer says we might be too weak to accomplish very much, and our cavalry, I am afraid, is proportionately weak. Could we afford to detach them for large turning movements? I think it is doubtful. At any time, however, a great opportunity might be seized by a dashing cavalry leader, and once the cavalry commit themselves to such a movement, the artillery will act entirely on their own account. I am afraid I have made a very lame comment on the lecture. But I should like to ask the lecturer on what portion generally of the hostile cavalry should the fire of the guns be directed? I cannot think it will be on the first line; I think it ought to be chiefly on the supports and reserves.

Lieutenant-Colonel E. O. HAY, R.A. :—In reference to the question raised by General Wood may I venture the suggestion that a man who only plays some pieces on the chessboard himself and leaves some one else to make the moves of some difficult piece for him, will not probably succeed in winning his game. Thus, in the fight of the independent cavalry, the direction of the horse artillery must be undertaken by the cavalry leader himself. His previous reconnaissance of the situation and the ground resulting in the handling of the horse artillery as well as in the accurate timing of the blow he strikes



with his cavalry. He will thus allow time for the horse artillery (launching forward at speed) to take up the position which he has forecast for them, and which dominates the enemy's cavalry during the charge. The horse artillery will then be in time to fire on the first line of the enemy's cavalry—the one thing it exists for. "Ranging" will not be difficult; for the range will surely be extremely short, the target extremely large, and the fire an enfilading one. All depends on the cavalry movement and final charge being timed by the same mind as has launched the horse artillery into position.

The LECTURER :—As regards General Wood's question as to what we gunners would fire at under the conditions mentioned, I really think that is a matter which must be left to the circumstances of the moment. If I must answer it, however, I will say that we should fire at what presents the best target. But I think that artillery would in ordinary cases certainly have time to fire at the first line, and, if it had time, it should do so. When the first line did not offer a target, as might happen if it were masked by our own cavalry in their attack, or if there were no time to engage it, then the guns would devote their attention to the second and third lines. But it would be very injudicious to lay down a hard and fast rule, and to say to an artillery officer that he should always fire at this or that particular line. A fold in the ground might make all the difference, owing to it the second line perhaps not being much exposed, and the third under cover altogether. I think it must be apparent that it will be best to let an officer on the spot decide such a question. As regards the rapidity of artillery fire in the cavalry combat, what I should like to say is that under the system which we now adopt, in which we utilize "magazine fire," we can arrive at great rapidity, and such fire is very effective up to 1000 yards. It takes the place of the old *mitraille* with smoothbores, the horse artillery projectile of the past; the guns are laid as for "case" with fingers, and are not run up between the rounds, so that we can get a good many more in than we can when firing shrapnel. I think this nature of fire would be very useful in purely cavalry battles, and personally I hope guns in such combats will not hesitate to go in within 1000 yards of their objective should it be necessary to do so. At such ranges and utilizing "magazine fire" I believe they will be able to fire sufficiently rapidly to produce a great impression, even on squadrons moving fast, and will be able to give the closest support to their own cavalry. Colonel Hay has partly answered another question raised by General Wood. I do not think that guns should act entirely on their own account in a turning, or any other, movement. If what I said has given rise to any such impression, I have not expressed myself clearly. What I intended to urge was that, when left without orders, the artillery leader must not be afraid to act as he judges best, and in turning movements I suggested that the artillery might frequently be called upon to play the principal rôle. The coöperation of guns with cavalry is a matter which largely depends on a complete understanding of and between the two arms, and on a good forecast on the part of the cavalry leader. But once he has made the first forecast it will be very difficult for him to alter any arrangements, and then the artillery officer must very often act on his own responsibility. There does not seem any other point left for me to touch upon, but I may perhaps add that practical experience together is the only way to insure that intimate knowledge of one another which is so essential to success.

General H. R. H. the DUKE OF CONNAUGHT :—It only rests with me to thank Major May for his very able and interesting lecture. He has given us instances in which cavalry and horse artillery have been of the greatest use. He has shown us, and quite rightly, that the duties of combined cavalry and horse artillery are now, and will be in the future, as potent as they have been in the past. One thing I am sure must have struck us when listening to his interesting lecture, and that is how important is the harmony that should exist between the officer commanding the cavalry force and the officer commanding the

horse artillery attached to him. The answer to the last question shows that a great deal must be left to the artillery commander's own sense, and especially the quickness with which the movement has to be effected. It must depend upon him to follow up the operations of the cavalry and carry out their object. This may be done in one way or another, according to the circumstances of the case. I feel confident, and every officer here present will feel the same, as to its being essential for the successful working out of any movement, be it reconnaissance, direct attack, or flanking movements, that there should be complete harmony between the cavalry and horse artillery, and that each should recognize the importance one is to the other.

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## COMPETITIVE PRACTICE IN THE GARRISON ARTILLERY AND ITS EFFECT ON THE TRAINING OF OFFICERS AND MEN.

BY MAJOR P. SALTMARSH, ROYAL ARTILLERY.

*(Proceedings of the Royal Artillery Institution.)*

PREVIOUS to 1891 shooting competitions in all branches of the artillery were, as we know, confined to individuals. A written examination was held and the six N. C. O.s and men who obtained the greatest number of marks fired so many rounds apiece at a standing target, the results were added to those obtained in the paper work and money awards allotted accordingly.

Except among the competitors themselves these proceedings evoked no great interest, and this kind of prize shooting had but little effect on the training of the battery generally.

The introduction of the present system of competitive practice in 1891 was certainly a happy thought, and the regiment is much indebted to the officer to whom it occurred in the first instance.

Since its introduction in 1891 two important amendments have been made to the rules for carrying it out in the garrison artillery.

In 1893 it was ordered that half the gun-layers employed at the practice should be selected at random by the chief umpire from all the paid gun-layers of the company, which the battery had now become.

In 1895 it was further ruled that as many gun detachments as possible were to be formed, out of which the chief umpire was to select four at random.

In addition to the above changes, I may mention that, whereas in 1891 and 1892 the competitive practice was almost invariably carried out when possible at a Hong Kong target; \* the number of hits on a battle-ship being estimated, since then a record target has generally been used, and this year, of course, the regulations have enforced the use of the latter among companies competing for the D.-A.-G.'s cup.

I propose now to discuss, first, the effect of the system generally on the

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\* See JOURNAL No. 67, January, 1894.

training of the personnel of the garrison artillery and then deal with the alterations alluded to above.

Quoting from the report of Commandant School of Instruction, Western Forts, on the practice of 1891, page 9, paragraph 41—

“The keenest interest was evinced by all batteries in regard to the new system of competitive practice. Without entering on any ample consideration of this system, I would remark that it was felt by all to be a much more thorough test of the efficiency of the battery through all ranks. Far deeper interest was called forth from the officers, and every man of the detachment felt that he was conducing towards the hoped-for prize for his battery.”

All this is true to the letter and, as a battery and company commander, both before and since the introduction of the new system, I cannot speak too strongly in favor of it as compared to the one in vogue before 1891; instead of the interest in the shooting being confined to a few individuals, it is now shared by every one in the company, greater care is bestowed on the preliminary drills of the latter and a commanding officer pays far more personal attention to the training of his officers, gun-captains, range-finders, and especially his gun-layers than he did before.

Good, however, as it is, generally speaking, the system is not unattended by some disadvantageous effects, which I will endeavor to enumerate.

(1) It induces a commanding officer to train his men more with a view to their doing well at competitive practice, than to their rendering a good account of a hostile vessel.

With our present launches it is difficult to tow a record target at more than seven or, at most, eight miles an hour; in practicing a company at drill, therefore, a commanding officer not unnaturally selects if possible as objective, a sailing vessel or yacht moving at this rate of speed instead of a steamer tearing through the water at 18 or 20 knots, which is what he would probably have to shoot at in actual warfare.

Any one who has practised at Warden or Cliff End batteries at drill at our slowly moving targets and has then tried to change on to the Jersey boat or a torpedo destroyer, will know well what I mean and how many “fresh lays” there will be, especially with young officers and gun-captains when first practising at the rapidly moving objective.

Again, men are generally trained at drill to lay at a vessel broadside on and seldom at those approaching or going away from the battery direct.

(2) One method only of range-finding, the D. R. F., almost invariably being used for competitive practice, other methods are more or less sacrificed to it.

In his report for 1891, page 22, par. 58, the Commandant School of Instruction, Golden Hill, states:

“The D. R. F. system has been more thoroughly worked out than the P. F. Far more time and practice has been devoted to it, the consequence is a far higher degree of perfection has been attained.”

Again, in annual report of School of Gunnery for 1893, page 17, par. 22: “Practice with D. R. F. was better than with P. F. throughout.”

During his preliminary course of training, rarely lasting more than three

weeks, a company commanding officer has a great deal to teach his men, many of whom are employed during the rest of the year. Battalion and company drill, carbine exercise and physical drill must be perfected, some time must be devoted to repository exercises and single gun drill; is it to be wondered then that when fire discipline is taken in hand the P. F. is shirked and, in view of the competitive practice, all available time given to the D. R. F.?

(3) Under the present system, one day makes or mars a company, it is classed and judged almost entirely by its competitive firing; sufficient importance in consequence is not attached to the remainder of the annual practice, including shooting with the P. F.

Dealing now with the regulations as to the selection of competing gun detachments and gun-layers by the chief umpire.

Before 1893 a company commander selected his four best gun-captains, his four best layers and made up his four best detachments for competitive practice.

In 1893, as mentioned above, this was changed as far as gun-layers went, and out of the four used, the chief umpire now selects two and the company commander the other two out of all the paid gun-layers.

This regulation has, of course, one very beneficial effect; it obliges a commanding officer to bestow great attention on the training of all his layers, and especially on the weakest.

On the other hand it has, I respectfully submit, the following disadvantages:

(1) It introduces a powerful element of luck into the competition.

Out of the, say, one hundred men available in the company, I defy any man living to produce twelve, let alone eighteen gun-layers of anything like equal capacity and it makes every difference in the world to a company's chance of success at practice if the two best or the two worst are chosen. I will illustrate this by what occurred last year to my own company.

In 1895 I produced for competitive practice 14 gun-layers; these might be classed as follows:

Class (1) 1 man—absolutely reliable.

Class (2) 5 men—very reliable.

Class (3) 5 men—fairly reliable.

Class (4) 3 men—uncertain.

Out of these I selected the first enumerated and one of Class (2), the chief umpire happened to select two more out of Class (2), so that out of my six best layers four were selected, "two by honors to begin with."

As I expected not a shot was off the line during the practice, but had two men out of Class (4) been taken the result might have been very different; this year I had not the same luck and lost two hits owing to the selection of a young and somewhat inexperienced gun-layer.

(2) The obligation to keep up so many really well-trained layers necessitates their being changed after pretty well every round during the service practice; this of course does not improve the shooting.

There are really not sufficient rounds allowed for the number of layers;



when the ammunition allotted for shooting with P. F. predicting is deducted, two or, at most, three rounds per gun-layer is all he is able to fire before the competitive.

(3) The present system of selection of layers prevents, in many instances, men working in their own detachments. This is opposed to the great principle advocated in all branches of the service of keeping always the same men together at their work.

In 1895 and 1896 as many gun detachments as possible had to be produced, out of which the chief umpire selected four for the competition.

This change undoubtedly increased in a company the number of men really efficient at gun drill, with the exception of his D.R.F. squad, his signallers and dial numbers, a commanding officer is now obliged to see that all his men are accurately acquainted with the drill of at least one heavy gun; moreover, he has to keep up more really well-trained gun-captains.

It has the following disadvantages:

(1) The element of luck again; this, however, is not nearly so marked as in the case of gun-layers; it is far easier training eight good gun-captains than eighteen gun-layers, and detachments can, of course, be easily equalized.

(2) Subaltern officers may not have their own sub-divisions under them. This is a serious defect which can, I think, have been hardly appreciated when the regulation was framed. On the most important day of the year to the company, professionally speaking, the chances of selection may take away some of his own men from a subaltern and put him in command of others not belonging to his own half company. Is this desirable?

With regard to the use of the record target instead of the Hong Kong; direct hits when firing at the former are, of course, more satisfactory than estimated ones when firing at the latter, when the judging cannot, of course, be absolutely exact. Competitive practice too at a record target causes greater pains to be bestowed on the training of gun-layers than if a Hong Kong is used.

The larger target, however, moves through the water less rapidly and has consequently the disadvantage, as pointed out above, of encouraging the training of men at a slow objective; moreover, if struck low, it easily breaks up, in which case firing has to continue at perhaps only a small portion of the original structure, overs and unders, rights and lefts, having to be estimated, all the disadvantages without the advantages of a Hong Kong accruing in consequence.

This liability to break up introduces another element of luck; a company which does not destroy the target has a better chance of success than one that early in the practice does so, *e. g.*, if the target is smashed the second or third round, just as the battery commander gets his range, great delay is caused and he has to commence his sequence of fire, so to speak, over again; moreover, it is much more difficult judging the errors of shots if the portion of target left to fire at is so small that the correct line of fire is behind it.

For instance, if a piece of the original target, say twelve feet long, remains, a perfect line for the shot is six feet behind it, *i. e.*, where the centre

of the original target would have been if it had not been shot away, now if a shot along this line strikes the water eighty or ninety yards beyond the target it looks a good range from a low site battery even through the best of telescopes, whereas if the original target is in existence the battery commander knows at once that an over shot failing to strike it must be at least the permissible error (about 50 yards at 2000 yards from a low site battery) beyond.

The same remarks apply to judging shots falling short of the target.

It may, therefore, make considerable difference in a company's shooting if the target is or is not broken up during the first few rounds.

To sum up : if a record target could be towed as fast as a Hong Kong, and if it could be so constructed that it would not break up, it is undoubtedly the best to use, under the present conditions it is to my mind a very open question.

Let us now consider whether, without altering the general system of competitive practice, certain modifications might not be introduced with the object of minimizing some of the disadvantages I have spoken of.

What I suggest for consideration is this :

(1) That out of the ammunition allowed to each company for its annual course, a few rounds be handed over to the company commander for elementary practice pure and simple, such practice to be entirely in his hands and to be carried out in whatever manner and with whatever range-finders he wishes, this will enable him to practice his untried gun-layers, etc.

(2) That the whole of the rest of the practice be competitive, the ammunition being allotted in equal proportions to P.F., to P.F. as D.R.F., and to D.R.F.

(3) That a fair proportion of rounds be fired at a single Hong Kong, or the fastest target obtainable, and that it be arranged that most of these rounds are fired when the target is being towed with the tide. Under such circumstances 12 to 15 miles an hour is attainable with a steamer of the *Osprey* type.

Suggestion number (2) at once sweeps away the disadvantages of the present system of selection of gun detachments and gun-layers for the competition by the chief umpire, for all gun detachments and all gun-layers can now take part in the competitive practice.

Subaltern officers can throughout command men of their own half companies and layers can be employed with their own sub-divisions. The element of luck vanishes.

This suggestion, moreover, at once prevents preference being given to any particular method of range-finding and obliges a commanding officer to train his men equally carefully in all.

I submit also that this arrangement is a truer test of the efficiency of a company than a single day's practice, which may be marred by bad weather or a crowded range.

Suggestion number (3) encourages a commanding officer to train his men at rapid objectives.

Until an automatically moving one is introduced, it is, of course, im-

possible to shoot at a target approaching or departing from a battery direct, and in consequence men are rarely trained to lay on such an objective, some practice might, perhaps, be obtained by anchoring 5 or 6 barrel targets in line and shooting rapidly at them in succession, taking the furthest first to represent a vessel approaching and the nearest first to represent one steaming away from the battery.

I believe a Brennan torpedo has been used to shoot at, but the installation below Cliff End battery is, I fancy, the only one possibly available for this purpose.

I am aware that these proposed changes have their disadvantages, some companies do not get the same chance of practising with P.F.'s that others do; on the other hand, under the present arrangements, companies, who man casemated forts where a D.R.F. is never used and where men never lay or practice with straight-edged sights, have to carry out their competitive practice with this method of range-finding.

These matters can be equalized when grouping companies for the competitions. Combined practice also creates some difficulties, as one fort is easier to shoot from than another; still this can be to a great extent neutralized by having two days' combined shooting, when, of course, one company would take one fort one day and another another.

The duties of the umpires would, undoubtedly, be more complicated and arduous, but still, I think, would present no insuperable difficulties.

Should the idea of spreading the competitive practice over several days' firing be not contemplated, I would, in order to eradicate the element of luck, suggest the following modifications in the selections of gun detachments and gun-layers by the chief umpire.

Each half company to produce as many detachments as possible—as a rule this is four, or two per sub-division—the chief umpire to select one out of each sub-division or, at any rate, two out of the half company; this will insure the half company officer having command of his own men and will equally insure the same number of well-drilled detachments as under the present system.

With regard to layers, I should propose that two per competing detachment be told off and that they be changed in the middle of the practice. This will prevent any luck as to selection and will insure the layers being employed with their own sub-divisions.

I am aware that this arrangement necessitates the production of only 8 gun-layers for the competitive, but a commanding officer would have to keep up at least 4 or 5 more in reserve in case of casualties among his 8 best.

Differences in local conditions would probably necessitate the biennial competition for the D.-A.-G.'s cup being confined to one day's practice only, still this need not interfere with the adoption of the methods I have suggested for the group prizes.

# Military Notes.

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## DIFFICULTIES OF THE DEFENSIVE.

MAJOR C. B. MAYNE, R.E., delivered at the Royal United Service Institution the first and second parts respectively of a lecture on "The Difficulties of the Tactical Defensive and how to meet them." In the first part of his lecture, Major Mayne, premising that the subject ought to be considered separately in its two branches of strategy and tactics, but that time would not allow him to deal in any way with the strategical defensive, the study of which should never be undertaken until a thorough grasp had been attained of what is entailed in the expression "the tactical defensive," observed that the object of each side in war, and especially in battle, was to disorganize and to demoralize the enemy, that is, to break up his organized units, and so to render them incapable of direction and control, and to frighten them into retreat or laying down their arms. In strategy an army could be disorganized and demoralized by depriving it of its means of existence, and by defeating it in detail. But the means of disorganizing and demoralizing the enemy on the battle-field were fire and shock, that was, by distant destructive action and by the close application of brute force.

The spirit of war demanded that both sides should take the offensive. As a matter of fact, only one side did this, because the political, strategical, administrative, and tactical circumstances of the case forced one side—whether it desired it or not—to act on the defensive. So that the choice of the offensive or defensive was not, as a rule, a free one. Whichever side at the moment of collision was relatively inferior from strategical, administrative, or tactical considerations, that side adopted the defensive, not because it desired to take up that attitude, but because it could not help it. Political reasons also may demand the defensive as a matter of policy. The offensive in war was the sword, the defensive the shield; and to win in war the sword must be used. The purely defensive could never win.

The primary object of the defensive was to enable a small body to effectually resist a larger one until the latter had been so weakened that the former could attack it successfully; that was, until the relative strengths were inverted. The secondary object of the defensive—one that grew out of the primary object—was to enable a body to gain time by its power of resistance, so as to allow of the free action of another body acting elsewhere, or which was coming up to reinforce it.

The advantages of the tactical offensive were that the assailants gained the initiative in making movements, and could choose the time and place of assault; they gained also the great moral effect produced by forward



movement, and by being able to lay down the law to the defenders ; further, the offensive alone could procure decisive results. The disadvantages of the tactical offensive were that the troops of the assailant had to continually move forward, and thus had to expose themselves to the enemy's fire, suffering much loss, and to keep changing the sighting of their rifles for imperfectly guessed ranges ; the rapid movement of the advance made the men breathless, and so reduced the efficacy of their fire ; reinforcements were hard to effect without mixing units, which only led to loss of control ; and it was almost impossible to keep an advancing body of men effectively supplied with ammunition.

The advantages of the tactical defensive were the selection of the ground to fight on, and its fullest utilization for battle purposes ; the position could be strengthened by field defenses ; the men did not undergo any physical exertion to disturb their aiming, but fired from a stationary base over known ranges, and thus their fire should be very efficacious ; the men, being covered, should not suffer much from the enemy's fire ; the supply of ammunition was easy, while stricter supervision could be maintained over the fire, which was also easier to control ; the disposition of the troops was concealed, and the defenders had a complete knowledge of the battle-field. The disadvantages of the tactical defensive were the uncertainty of the direction of the enemy's attack ; the bad moral effect of the men having to remain for a long time stationary under the disturbing effects of the enemy's fire and of seeing him gradually advance ; and that the defenders had to follow the moves of the assailants. These disadvantages, however, could be largely minimized by making use of sorties or counter-strokes, which should form the soul of the defense from the moment that the enemy arrives at about 400 or 500 yards from the position.

Thus the advantage of the offensive were chiefly of a moral nature ; while those of the defensive were of a material nature. And as the offensive alone could procure decisive results, and as the attack was easier to carry out than the defense, every defense that sought for decisive results must, sooner or later, pass to the offensive, both to gain the desired decisive result and also to shake off the difficulties that surround a defensive attitude. The commander who deliberately took up a defensive position with the determination of fighting it out with the enemy on that one spot would, unless the circumstances of the case were extremely favorable to such a decision, lay himself open to very serious disaster if he were opposed to a well-trained enemy led by an energetic general ; and therefore, although a defensive attitude might be decided on as a mode of temporary action, yet the actual locality on which it is to be applied should only be looked upon as conditional to what might take place. And here was presented a most serious difficulty that the defensive had to accept—it must be prepared to fight, and yet be prepared to retire in the face of a pursuing enemy to another position further in rear, or to a flank. The first great difficulty for a defending general was to determine whether the enemy would attack at all, and, if he did attack, his next difficulty was to determine the direction of the enemy's decisive blow.

An army being composed of impressionable men and horses with nerves, the effect of fire on them was a most serious fact to be considered; and we were confronted with this difficulty, that we did not know the battle effects of modern weapons. Some writers were of opinion that the battles of the future would entail greater proportionate losses than in the past, but, so long as human nature remained impressionable, so long would it yield before danger when that danger had been sufficiently impressed on it. The resisting power of troops was far more of a moral than a physical question; and hence disciplined troops could stand greater losses than raw troops. The only effect of improved weapons would be to produce the desire for retreat at longer ranges than in the past, the moral factors being supposed equal in each case. So far, however, as peace experiments could be relied on for giving data for war experience, the artillery arm had gained more than infantry by modern improvements in weapons, in the power of producing demoralizing and disorganizing effects on hostile troops. In fact, the relative importance of artillery had risen largely of late years.

A very crucial feature in all defensive arrangements was the question of time. The defender wanted time far more than the attacker—the defender wanted time to make his preparations before the enemy's projectiles began to arrive; the assailant was not tied by this desire, and in all defensive problems it was extremely important to deal with each one of them under different conditions of available time and strength of force.

A point that must be seriously borne in mind in taking up any defensive position was the problem of water-supply. In fact, the question of the supply of water and food was of vital importance to all troops, whether on the offensive or defensive; but often the defensive position, being on high ground, was at a considerable distance from the source of water-supply, and hence arrangements should be made to enable the troops to be supplied with water and other necessities of life at intervals during the day, for they got very thirsty in the excitement and distress under the exciting conditions of battle. Whether the battles of the future would be of longer or shorter duration than those of the past was a question; but should they last for two days, as some writers predicted, then in addition to the supply of ordinary wants, we should have to arrange for the actual replacement of the first-line troops during night time so that the battle might be continued at daylight with troops whose nervous energy had not been used up.

Major Mayne, in the second part of his lecture, delivered yesterday, expressed the view that the "pivot of manœuvre" principle was the key that unlocks the difficulties of the defensive either when applied tactically on the battle-field or when applied strategically on the theatre of war. The disadvantages of the defensive were chiefly moral, and, therefore, the means of overcoming them must also be chiefly moral—viz., by demoralizing the enemy by concentrated fire over known ranges, by the use of field defenses as "temporary pivots of manœuvre," in order to economize men and heap up reserves, and by the use of these reserves in opportune local and general counter-strokes. These means applied, each in their own sphere, to the defense of small localities, or of long positions embracing several of such localities, or of a large area of country when carrying out a defensive

strategy. In this last case, the pivots of manœuvre would be the fortresses and entrenched camps or positions of the country round which the field armies would manœuvre and strike at the flanks of the enemy after he had become engaged with the garrison of the pivot of manœuvre. In the first case, that of a small locality, the principle of pivots of manœuvre with offensive movements made on either or both of their flanks also found not only a ready application, but it was the only method of procedure that promised any assurance of success. Within a locality, counter-attacks were really the only means of compelling the retreat of the enemy, especially if they were directed on the flanks and rear of his detachments. Thus on a large or small scale the defensive found its best use in being applied in conjunction with the delayed offensive. A part of the force acted on the defensive in a defensive position, and while the enemy attacked this position he was counter-attacked in flank by another powerful force. It was the same idea as was involved in the principle of "temporary pivots of manœuvre," combined with a striking or manœuvring force, which struck at the psychological moment, or moment of demoralization in the enemy's ranks. The German manœuvres of 1895 afforded very good illustrations of the principles advocated.

The great difficulty in the matter lay in our not being able to properly realize moral effects in peace-time; and the consequence of this was the universal neglect of rehearsing the proper method of defense in peace manœuvres. Another great difficulty lay in the choice of the right moment for delivering the various local and general counter-strokes. Again, the change of the attitude of the whole force from the defensive to offensive was by no means an easy operation. The consequence of all these difficulties was that "higher qualifications are required to make an able defense on a large scale than to direct an attack with adequate means." However, by acting on certain principles, involving a reliance on the operation of the moral factors of human nature, many of the difficulties of the defense which chiefly arise when the fight rages within a short distance of the main position were completely met by the actual transference of the close range fighting from the vicinity of the defensive position to the vicinity of the line of attack, thus transferring to the attackers the rôle of the defensive with all its difficulties. But to enable this to be done, the physical features of the position must lend themselves to the application of these principles. The necessity of the defensive acting on the offensive was admitted by all writers, though they usually failed to state in more detail how this should be done.

If the object of battle was the annihilation of the enemy's means of resistance, and if the offensive was the only way of procuring a decisive result, then the defensive must be abandoned before the end of the fight, and the offensive vigorously assumed, or else defeat would have to be accepted. By accepting these principles of action, the near defensive close to the position became a thing as little thought of as defeat, because it was now transferred over to the enemy in front of the position by having been changed into the offensive. The truest principle of war to act on was that the secret of success lay in a bold and energetic offensive, and not in passive

resistance, and that, therefore, a general counter-stroke could alone win a decisive victory for the defensive.

The chief points to be carried out in defending a tactical position that it has been decided to hold were: The position should have such a gentle slope to the front as to form no impediment to the execution of counter-strokes, and there should be a clear field of fire for as long ranges as possible. The position should be divided into defensive and offensive portions—*i. e.*, into pivots and fronts of manœuvre. The pivots of manœuvre should be strengthened and covered with obstacles invisible at a distance to the enemy. The guns should be massed so that they could, by their concentrated fire, defend their own front in day time, and be able to turn their fire in any other direction. The infantry would be on the flank of the guns disposed in three lines—the first to form a shooting line with the usual supporting troops, the second to form local reserves to protect the flanks and execute local counter-strokes along the front of the position, and the third to form a general reserve to execute a general counter-stroke; the pivots of manœuvre to have their own special commanders and reserves. Ample reserves should be collected behind the offensive portions, or fronts of manœuvre, of the position. The more difficult the nature of the ground and the greater the advantages it gave the enemy, the greater must be the amount of the local reserves allotted to that point; the flanks came under this description. There should be maintained on the enemy a continuous and well-directed infantry and artillery fire, delivered from covered emplacements and trenches and over known ranges, for the purpose of demoralizing and disorganizing the enemy's troops as early as possible. The local reserves should be employed in opportune local counter-strokes as soon as the enemy got to within 500 yards of the main position. The general reserve should be employed in a general strategic counter-stroke to decide the battle when the enemy was felt to be sufficiently exhausted. A pivot of manœuvre should be constructed in rear as a "rallying" position, and arrangements made for the regular and frequent supply of ammunition, water, and food to the troops, especially to those in the front line, and for the collection and transmission of information to head-quarters.

From the foregoing it would be seen that entrenchments, or field defenses, found their highest value and truest use as pivots of manœuvre acting as tactical supports in battle. And in the words of Lieut.-Colonel G. F. R. Henderson, whenever a general has thought more of maintaining his ground than of annihilating his enemy, whenever he has let his enemy's blunder go unpunished, when he has neglected his opportunities of dealing with him in detail, when he has trusted to his entrenchments to win his battle and not to the vigor and timeliness of his counter-strokes, then the strongest position, the most elaborate system of entrenchments, have proved but a broken reed. "Entrenchments," says Meckel, "are the shield of the defensive; the counter-stroke is the sword."—*United Service Gazette*.

#### GUNS OF H. M. S. PRINCE GEORGE.

The 12 in. gun, two of which are situated in each barbette of H. M. S. *Prince George*, is 40 calibres in length, its full length being 445½ in. or 37



ft.  $1\frac{1}{2}$  in., and it weighs 46 tons. The entire gun from muzzle to breech is wound with wire, and the outer course over the wire is composed of two tubes only, that over the chase portion being considerably longer than half the length of the gun. A short screwed hoop makes the connection between these two where their ends abut. A notable feature is the double barrel consisting of two concentric tubes, the inner one fitting exactly throughout its entire length into the outer one. This arrangement has been designed with a view to facilitating and cheapening the relining of the gun, as the entire inner tube or a portion of it may be withdrawn at any time and replaced at comparatively slight expense, making the gun practically as good as new. The wire or ribbon used on these and on the 6 in. gun is  $\frac{1}{4}$  in. wide by 0.06 thick, and its ultimate strength per square inch of cross section lies between 90 and 110 tons. It is wound on in a number of separate sets of layers, the tension varying between about 30 tons to 60 tons per square inch, according to the position of the layers. The actual weight of wire on each 12 in. gun is approximately 12 tons, corresponding to a length of nearly 100 miles. The projectile fired weighs 850 lb., and the bursting shell is over 5 ft. long. With the full charge of  $167\frac{1}{2}$  lbs. of cordite, a muzzle velocity of 2400 foot seconds is obtained, the muzzle energy reaching 738 foot tons per ton of gun—a figure far exceeding anything before obtained with large ordnance, corresponding to a perforation of wrought iron by Krupp's formula of nearly  $31\frac{1}{4}$  in. at 2000 yards. These guns can be fired from the fixed loading position at the rate of four rounds in five minutes, which is nearly double that of the guns of the *Royal Sovereign* class.

There are also twelve 6 in. quick-firing guns, all mounted in armored casemates, eight being on the main deck and four upon the upper deck. Sixteen 12 pounder quick-firing guns are mounted upon the main and upper decks, the latter being behind the vertical walls beneath the boat deck, and between the corner casemates of the upper deck, so that their positions are sheltered from raking fire by the casemates. The armament is completed by twelve 3 pounder Hotchkiss guns in the fighting tops on the masts, two 12 pounder 8 cwt. quick-firing boat and field-guns, and 8 0.45 in. Maxim guns, mounted in various positions upon the superstructure. Twenty-two torpedoes will be carried, which can be fired from four submerged tubes, two forward and two aft, and from one above-water tube at the stern.

The six inch guns were manufactured at the Elswick works. They are of wire construction. They are 40 calibres long, the total length from breech face to muzzle being  $249\frac{1}{4}$  in. Broadly speaking each gun consists of a long tube technically known as the A tube, or barrel bored out to exactly 6 in. diameter for the greater part of its length, the chamber section being tapered to allow of the free removal of the brass cartridge case. On to the rear portion of this tube is contracted a second tube, and round this is tightly bound the steel wire or ribbon, the tension varying in successive layers, according to the principles formulated by Mr. Longridge. Over the wire is lightly contracted a jacket, on which are cut the steel keys designed to prevent any rotation of the gun by the inertia of the shell in the rifling, and to cause the gun to recoil in a straight line. Finally, over the muzzle half of the A tube a chase hoop is shrunk on, and over the rear end of the

jacket is screwed and contracted the breech ring, from the lower side of which projects a stout arm to which the piston rod of the recoil cylinder is secured. The breech mechanism of these and the 12 pounder guns is of the usual Elswick quick-fire pattern. The breech screw is made on the interrupted screw principle, a part of a turn being sufficient to unlock it. But it differs from the screws of other makers in having its front half steeply tapered, the interruptions on this part coming opposite the full thread on the parallel part; the pressure is thus very much more evenly distributed round the gun than in the case of a parallel screw. The taper is at the same time necessary to allow the action of the breech mechanism, as will be seen presently. This mechanism consists of a strong bronze carrier, hinged to the right side of the breech ring. It supports, on a large spigot formed on its face, the breech screw. Rotating round the carrier hinge pin as a fulcrum is a long curved lever, which passes right across the breech of the gun when closed, and terminates in a handle. Attached at a point along this lever is a link, the other end of which is hinged to a block sliding in a guide cut in the carrier. Into this block fits a pin, secured at right angles to the rear face of the breech screw, and at some distance from its centre. Suppose now that the breech is closed ready for firing, the long lever and the link lie close against the breech screw, the sliding block being pushed to the limit of its stroke in the guide in the carrier. To open the breech the lever is pulled steadily backward from the gun, just as if the breech were closed by a simple valve or door. This action puts a tension on the link, which in consequence draws the slide block toward the carrier hinge, and this movement must evidently cause the breech screw to receive a partial rotation through the medium of the pin in its face fitting into the block. The continuation of this movement of the hand lever after the unlocking action is complete causes the whole carrier to swing on its hinge, bringing the breech screw out with it.

#### EXPERIMENTS IN MILITARY BALLOONING.

A series of experiments are being made at Shoeburyness by the officers of the ordnance department and the superintendent of experiments at the school of gunnery on the one hand and the officers of the school of military ballooning at Aldershot on the other, says *Public Opinion*. A captive balloon was sent up over the estuary of the Thames, attached by a cable of about 700 yards to a boat loaded with ballast, which was set adrift on the water. The weather was somewhat boisterous, and the morning dull and hazy. The field piece was placed on the marsh land beyond the school of gunnery, from where the firing took place. The distance or range was ascertained to be about 4000 yards. The gun was worked by the staff of the school of gunnery, under the direction of Major Hickman, R.A., assistant superintendent of experiments. Shrapnel shell was used, and good practice was made from the first. On the sixth round, however, excellent elevation and direction and distance were obtained, and the shell was observed to burst almost immediately over the balloon. After oscillating for a few seconds, the balloon was observed to be collapsing, and then it gradually fell. Its descent was slow, and, as far as could be judged, had the car con-

tained any occupants, it is possible they would have sustained but little, if any, injury had the balloon fallen on land. When it was seen that the balloon had been injured and was descending, the boat to which it was captive was picked up and towed to land, and the balloon was packed up and later in the day sent back to Aldershot. It was impossible to ascertain the extent of the injury which was done to the balloon itself, but the wicker car appeared to have sustained little or no damage. The experiments were at once suspended, and a report was drawn up and forwarded to the War Office.—*The Scientific American*.

#### BALLOONING.

Ballooning for warlike purposes has made immense strides since the subject received the official recognition of the War Office and a series of experiments, to which we have referred from time to time, were commenced at Aldershot. Despite, however, the great attention which has been devoted to the subject in England, it is from Austria that we receive particulars of experiments of the most important character. These experiments, which have been carried on at the fortress of Steinfield, near Vienna, were intended to show the effect of artillery attack upon balloons. It is evident from the result of the experiments that the balloon has only one enemy—namely the cannon—and that small holes produce an inconsiderable effect even in large numbers. The difficulty of laying the gun increases with the altitude of the balloon; sometimes it is found necessary to dig a hole for the trail, which makes the service of the gun slow and difficult. The balloon, therefore, should be as high as is consistent with effectual observation. The Austrians think that an altitude of about 800 metres (2625 ft.) has the advantage of spoiling the enemy's fire while allowing observations to be made. About 4000 metres distance (4375 yards) places the balloon outside the effective range of field artillery, without being so far off as to prevent the points which it is desired to examine being distinguishable. Lastly, any motion of the balloon, vertical, or lateral, renders artillery attack specially difficult.—*The Army and Navy Gazette*.

#### A FOLDING BICYCLE.

The bicycle, as ordinarily constructed, has only one real fault, which is that it is a clumsy machine to transport. It is difficult to ship an uncrated bicycle by rail or water without its running some risk of being injured. The folding bicycle largely obviates this difficulty and also permits of the wheel being stored in houses with great convenience, but the folding bicycle has another and often more valuable use. In France, where the bicycle has been made considerable use of in military manœuvres, the folding bicycle has been used with great success. The construction of the ordinary bicycle, valuable as it is in transporting soldiers, becomes, as soon as he dismounts, a hindrance to his motions and a burden which cannot be carried with ease, but must be trundled along.

Under such circumstances it is difficult to see how a soldier can handle a gun. If he lays his bicycle upon the ground, it runs a great risk of being injured and would offer an impediment to the free movement of the troops, and, if surprised by the enemy, it may cost him the loss of it; like



a rider without a horse, he would be very liable to be captured. Military bicycles often have to be transported very long distances through woods and swamps and hoisted over hedges and walls. The difficulty appears to have been solved by causing a machine to be constructed which can be carried by man when man cannot be carried by the machine. Various devices have been made to permit this folding. We illustrate an American invention of this class, the wheel in our engraving being made by the Dwyer Folding Bicycle Company, of Danbury, Conn. This bicycle has been put to actual use in military manœuvres and has been found very satisfactory. The Dwyer machine is arranged so that both diamond and drop frame wheels can be built capable of folding.

In the diamond frame wheel the joint is arranged in the middle of the frame, and in the drop frame wheels a similar plan is employed. The wheel is manipulated as follows: Stand on the left side with the left hand on the handle-bar (to keep the front wheel from falling around) and the



right hand on rear brace. Then press bolts forward and into recesses in locking tube, and with right hand lay rear wheel around against the front. If an ordinary handle-bar is used, set the handle-bar and saddle so that the handle-bar will go under or over the horn of the saddle. Special handle-bars make the folding more compact. The military wheels are especially ingenious and do not differ much in appearance from the ordinary drop frame wheel. It is the work of an instant to fold the bicycle. The soldier can then have free use of his hands to assist him in climbing or handling



his gun while the wheel is hung over his shoulder. The folding bicycle proves especially valuable to those who wish to make excursions on boats and cars. The wheel can be folded up and placed in the cabin of a very small yacht. The folding bicycle is especially convenient when it is desired to take it into the house, and the wheel is reduced to so small a compass that it can be readily packed in a trunk or box. The wheel has as much strength as the ordinary bicycle and it weighs only twenty-five pounds.—*The Scientific American*.

#### GERMAN FOLDING BICYCLE.

The Germans are not far behind the French in the matter of a folding bicycle. Messrs. Seidel and Naumann, of Dresden, have invented a machine, briefly described and illustrated in the *Militär-Wochenblatt*, which seems to have much in common with the cycle of Captain Gérard. It is a rear-driving safety machine with 26 in. wheels and pneumatic tires, and weighs less than 36½ pounds. It is specially adapted for military use, and when the man dismounts he can do so by merely placing his feet upon the ground, in which position the cycle is held in position between his legs, and he has both hands at liberty and can load, aim, and discharge his rifle, and immediately after be *en route* again. Like the French cycle, that of Messrs. Seidel and Naumann permits one wheel to be folded upon the other by means of a hinge-and-bolt mechanism in the strong double framework, and, so folded, can be suspended on the rider's back without greatly impeding his movements. No official trial of the machine appears yet to have been made, but Lieutenant von Holleben, of the First Royal Saxon Life Guard Regiment, who rode it in the manœuvres of 1896, found it satisfactory by day and night in all weathers, and on all kinds of roads. Herr W. Stavenhagen, who describes the machine in the *Militär-Wochenblatt*, regrets that, while German warships are built wholly of German material and Krupp's factory is "the first in the world," Germany has to purchase steel tubing for bicycles either from England or America.

#### A NEW ARTICLE OF FOOD.

Some of the troops garrisoned in Paris are now fed on a new article of food called Graisse de Normandie (Normandy dripping). Mutton tallow, from which the parts containing blood have been separated, is melted over a hot fire and cooked with the following vegetables: To every 100 pounds of tallow 5 pounds of carrots are added, 7 pounds of leek, 7 pounds of onions, 1 pound of celery, 500 grains of parsley, 500 grains of garlic, 50 grains of thyme and laurel leaves, also salt, pepper, and nutmeg. After this *olla podrida* has boiled for several hours the whole soup is put through a sieve, and the vegetable stuffs are thrown away. The remaining mass is formed into bricks, which can be easily made into soup by dissolving them in water over the fire. The food is said to be liked by the men and is very nutritious.

#### A NEW RIFLE.

The new rifle, styled "Mannlicher Model, 1896," whether it ever be adopted as a military weapon or not, has some interesting features which are mentioned in the last number of *Arms and Explosives*. It is question-

able whether any reduction of calibre beyond what we have arrived at in the Lee-Metford would be an advantage. The likelihood is that it would be quite the contrary, as the power to stop the rush of an enemy is already small enough in the projectile which we now use. The Austrian manufacturers have nevertheless turned out a magazine rifle, superior in many respects to any of its predecessors. Its calibre is .234, its muzzle velocity 2527 ft. per second, and its weight 7.7 lbs.; the bayonet adds .75 lbs. to the weight of the whole. It is claimed for the breech mechanism that, although of much reduced proportions, it is far stronger and more durable than that of more weighty military arms. The number of component parts is lessened, and the work of taking them to pieces is simplified. The barrel is entirely surrounded by the stock, and an improved attachment is provided for the bayonet, both of which precautions will protect the piece from the effects of rough work.

#### HORSE POWER OF MODERN GUNS.

One might be accused of romancing were he to assert that a gun is of several million horse power, and yet nothing is more exact, says the *Engineering and Mining Journal*. The 100 ton gun, with a 550 pound charge of powder, throws a projectile weighing 2020 pounds at an initial velocity of 1715 ft. per second. It communicates to it, therefore, a live power or kinetic force of 92,597,000 foot pounds. The thrust exerted by the gases due to the ignition of the powder lasts less than a hundredth of a second. The result is that during the active period of the work of the powder in the gun the mean power is greater than 87,000,000 foot pounds per hundredth of a second, say 8,700,000,000 foot pounds per second. This represents a power of 12,000,000 kilowatts, or 17,000,000 horse power. There is, unfortunately, another side to this picture. Although large guns are extraordinarily powerful, their active life is essentially ephemeral, since, after 100 shots, they are generally out of service. They have then worked actively one second! The same calculation applied to modern guns that throw 2200 pound projectiles, and communicate thereto an initial velocity of 1970 ft. a second, demonstrates, further, that such guns, during less than a hundredth of a second each time, develop a formidable power of 13,050,000,000 foot pounds per second, say 24,000,000 horse power.

#### MEDICAL TREASURE TROVE IN SWITZERLAND.

Our knowledge of the medico-military organization of ancient Rome owes not a few of its most distinctive details to Switzerland, says the *London Lancet*. Windisch, for example, the Vindonissa of antiquity, has proved to the Swiss archæologist a real mine of surgical treasure trove, lying as it does at the junction of the Aare and the Reuss and commanding on the one side the two Italian highways (from the Great St. Bernard and from Como) and on the other the communications with the Rhine and Danube.

Here was found the celebrated monument with inscription to Tiberius Claudius Hymnus, surgeon of the Twenty-first Legion. Here, too, has been unearthed quite an armamentarium chirurgicum in the shape of medicine chests, instrument cases, with pincers, scalpels, needles, catheters, and

such like in fine preservation. Dr. Conrad Brunner, of Zürich, has based on these discoveries a highly interesting monograph entitled "Die Spuren der Römischen Aerzte auf dem Boden der Schweiz," and the enthusiasm he has awakened in the medical branch of archæological research bids fair to fructify in even more precious discoveries. Not many days ago there was disinterred at Baden-im-Aargau, not far from Windisch, a Roman house containing fourteen apartments, varying in size, and with walls painted with designs of the highest interest for the classical scholar. When exposed to the light of day there appeared about the structure a number of fibulæ and vases and in the apartments themselves such a quantity of surgical instruments as to favor the conclusion that the house was neither more nor less than a hospital. This is in many respects a novelty in medical archæology. We have very clear notions as to what the valetudinaria or infirmaries for slaves on patrician estates were like; but a building for the wounded or ailing Roman soldier presents points of interest, as hitherto no such buildings have been found in their integrity. Moreover, when we add that never either in Switzerland or in any other scene of Roman military occupation has there been found so large an assortment of surgical instruments as in this newly discovered hospital near Baden, we have said enough to awaken scholarly and professional curiosity in the spot and to lend additional attraction to the picturesque "Kurort," known since the first century A. D. on the banks of the Limmat.

#### TETRA-NITRO-CELLULOSE—A NEW EXPLOSIVE.

When dinitro-cellulose, or ordinary soluble pyroxylin, is further acted upon by means of a mixture composed of equal parts by volume of nitric acid 1.5 density and concentrated sulphuric acid, there is, as is well known, produced a true trinitro compound, differing entirely from either of the above compounds as regards its solubility, and at the same time possessing far enhanced explosive properties.

If the resulting compound thus formed is again treated with a still more energetic dehydrating agent, composed of equal parts by weight of commercial vitriol and phosphoric anhydride, a further nitrogenous compound is obtained, which, after the usual washing and drying, presents a much more brittle structure than any of the preceding derivatives, in some cases even admitting of pulverization, and altogether a much more formidable compound, even exploding by mere percussion, its explosive violence as compared with the former bodies being more than double.

When the compound is digested in a strong solution of potassium chlorate, and carefully dried, it is rendered extremely brittle, and thus readily admits of being pulverized, forming a true percussion agent. As far as can at present be ascertained, the new explosive represents a tetra-nitro compound; but owing to its formidable explosive properties, necessitating considerable care in handling the same, further investigations are considered necessary in order to arrive at a correct formula. The compound, when submitted to destructive distillation, in contact with moist caustic potash, evolves hydrogen gas, together with large quantities of methylic alcohol.—*Chemical News*.

# Comment and Criticism.

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## I.

### "Proper Military Education."

Capt. J. S. Pettit, 1st Infantry.

WHEN I read Major Wagner's criticism of my essay, I was reminded of an anecdote I heard some time ago. A gentleman was knocked down on Broadway by a cab. The front wheels passed over him, and as he saw the hind wheels approaching, he exclaimed, What! Again! I have no intention of answering Major Wagner at length or in kind. Extensive notice would tend to supply lacking dignity. In matters of mere opinion the judgment of the readers will suffice. "Inferences" are purely personal, and have no material weight as evidence. Personality and sarcasm may be successfully used by great wits in heated debate and by youths who mistake them for calm arguments. Ordinarily they are accepted as indications of weakness in the cause, or the writer, or both.

I am aware that any group of men at West Point, Fort Monroe or Leavenworth, might extract the essay to suit their own views, and find much to criticise. There are as many different views of the Bible as there are sects in Christendom, infidels, agnostics, and others. Its value to mankind has not been seriously impaired by adverse criticism.

The atmosphere at Leavenworth seems to be extremely sensitive and easily put in motion. It is impossible to determine which is most unpleasant to them, praise or fault finding. I have no prejudice or feeling of unfriendliness towards the school, and still believe, as stated in the essay, "that it is unfortunate that it cannot give to all lieutenants of infantry and cavalry the advantages it offers to a few." If its sentiments are voiced by those who appear for it in public print, I may change my views.

No one is better qualified than the Major to speak authoritatively on the Infantry and Cavalry School. He has been identified with it almost since its origin. No one desires to rob him of one jot of the credit to which he is clearly entitled for his good work, but his public utterances would have greater weight if he would show more toleration for the views and opinions of others and curb an irresistible desire to be sarcastic, or amusing. It savors of the "New Journalism," and diminishes the weight of his arguments.

Some of his criticisms are mere amplifications of those of Colonel Hawkins, to which I have already replied. Others are merely matters of personal opinion upon which we may reasonably disagree without prejudice to either, such as, *Is the Infantry and Cavalry School "wholly" a post-graduate school?*

It has had, and will continue to have, many students who are not graduates of any college or university, and more who are not graduates of any *military* school. If these men can start on equal terms in Law, Ordnance, Gunnery, Military Engineering and Art of War with the graduates of the Military Academy, who are supposed to have had rigid training in those branches, there is something loose somewhere, and the sooner we locate it the better for both schools.

The Secretary of War, in his report of 1896, says, "by degrees its character has undergone some change, *in many respects taking* the character of a post-graduate school." We presume the Secretary's information was of the best quality. The Major frequently refers to the work for 1896. No doubt it was excellent, and we would agree upon that point. He knew very well that the report was dated Aug. 1, 1896, and was probably not



in the hands of the public until some weeks later. As my essay was turned in in June, 1896, I had no access to any information and must be acquitted of any desire or intention to overlook *any* work of that year. As to whether the school is properly adhering to the object of its existence or not, I refer the curious to pages 27 and 28 of the Major's report in the Annual Report for 1896. We may have different views as to the "object of its existence." This would not, of course, occur to the Major in preparing his peculiar style of criticism. My idea of this object can be stated briefly. If it is to remain a school for young lieutenants of various and unknown abilities and previous training, it should retain its name and make the course adhere to the needs and abilities of students. If it is to be made a "War College," in the usual acceptance and meaning of the terms, then it should have selected students, officers of rank and experience, who can demonstrate that they are prepared to give two years' time to the study and investigation of the highest and most intricate features of military art and science. It seems to me that middle ground would be mere temporizing with proper military education. Personally I do not believe we are ready for a War College. I do not think that our service training has reached the stage at which a War College is a necessity. Certainly not for 2d lieutenants. Some of my friends differ from me, but I do not find that any reason for personal abuse or a wordy tirade about nothing.

If it is impossible to maintain separate courses in infantry and cavalry, why not put them *all* under "military art," as the commandant suggests, and *double* the value of that department? For one I regret to see "infantry (including practical exercises) placed below law and engineering in a practical infantry and cavalry school." I note the Major's explanation of the difficulties surrounding this question and think it is a good one. I still adhere to "the importance of the terrain in military operations," but do not confound it with map making and surveying.

The Major grows eloquent when he reaches the statement that "*all of our schools have suffered severely from lack of good instructors,*" and loses his eyesight just at the end of the paragraph. He is an expert at "extracting" an article to suit his own purposes. I will quote the one immediately following. He forgot to do so.

"It is no disgrace to say of an officer that he is not a good pedagogue. Teaching as an art can be acquired only by long years of experience. If a man has no fondness for it and lacks the personal characteristics which win the students' esteem and confidence, he will never succeed. It is remarkable how very few really good instructors are found among men who adopt teaching as a profession.

"When we find a first-class instructor, we should keep him. His services are of vastly greater importance in assisting in the training of young officers than in doing routine garrison duty."

I am sorry the paragraph he refers to came under "The Infantry and Cavalry School," because some of its officials are particularly sensitive. The word *all* is a good old English word, and its meaning cannot be missed save by a great effort. The Major does not seriously combat the statement, but takes refuge in a eulogistic paragraph on his *confrères*. We are all in the same category. It is fortunately not permitted to us to know whether we are classed as "bad" or "good" by our judges. I give every man credit for as much purity of motive and honest endeavor as I claim for myself. Let us glance at some reasons for my statement.

1. Teaching school is an *incident* in an officer's career, and not the goal of his ambition.
2. Teaching is an art acquired only by long practice, and in many states a normal school certificate is necessary to secure a position as teacher in the public schools.
3. Instructors are sometimes detailed without much previous knowledge as to their fitness, and are allowed to remain when they should be relieved.

4. They are detailed to teach subjects in which they have no especial interest, for instance, a man fond of languages, teaches mathematics and *vice versa*.

5. They have been detailed to teach in subjects in which they have shown no unusual proficiency and have had no especial training—such as an artilleryman teaching engineering and a cavalryman teaching ordnance and gunnery.

6. Officers have been detailed to teach against their will. Like good soldiers they obey but cannot be heart and soul in the duty. It takes two or three years to make a good instructor of a man who has fine qualifications at the start. He is generally relieved shortly after he has become well fitted for the work. The Major is an exception.

If the Infantry and Cavalry School has been, or is free from these troubles, then it is not included in the statement, and I will be the first to heartily congratulate it on its remarkable good fortune. Each man can make an introspection of himself and appropriate to his own use and benefit, as much of the remark as he thinks justly belongs to him. I have, and have always had esteemed friends, in the Leavenworth faculty. They are perfectly aware that I would not offer them a gratuitous insult at any place or time. The incident is closed so far as I am concerned.

He again "extracts" a sentence for himself, as follows: "We need go no further than the War of the Rebellion for ample proof that soldiers are frequently born and rise to eminence through inherent qualities, and without the advantages of previous military instruction."

Blindness overtakes him again, and he misses a couple of pages, especially the following lines:

"If we could obtain youths with these natural gifts, and build upon them the other qualifications, the ideal would be reached."

All sane men agree on this point; discussion is childish.

He extracts again from the paragraph referring to the transfer of officers from cavalry to infantry, but stops short of the enacting clause, "*Some of the flagrant errors, made in the first assignments can thus be corrected.*"

Comment is unnecessary. The essay was not written for any particular branch of the service. My suggestion, that "For this work the class should be divided into two sections; one section to contain graduates of the Military Academy who have once been declared proficient in law, ordnance and gunnery, drawing, civil and military engineering; the other to contain officers who have had no theoretical instruction in those subjects. It is not possible to put both sections through the same course and do justice to both; either one will be unjustly retarded, or the other unduly advanced," seems to have excited some merriment in the mind of the Major, and he announces that I am a decade behind the times. I disagree with the gentleman, and predict that I am less than a decade ahead of the times. I knew years ago that the classes were divided at one time, and I was of the impression that the division was discontinued for *material* reasons, such as lack of facilities, quarters, instructors, etc. As I remember, the division was made by a sort of mixed examination without reference to previous training: I may be in error. If the Leavenworth course is "with the exception of law and a little engineering, *an extension and amplification* of the West Point course," as the Major claims, the case is bad indeed. If a second lieutenant promoted from the ranks can *justly* be placed in such a course to compete with West Point graduates there is ground for serious reflection as to the utility of maintaining the Academy. It is furthermore an anomaly in education. I am willing to be convinced, but say frankly, that I do not believe it at present, and will retract nothing from the paragraph quoted above. There are exceptions, of course, but a school cannot be successfully conducted on "exceptions."

Our ideas as to abolishing the system of marking students are in unison, and seem to

have originated at about the same time, but they gained priority of publication, which put mine in the place of re-inforcement.

I refer readers to the title of the essay as justification for including so many well-known facts in it. Why he tries to hunt up a quarrel with me for agreeing with him in so many things passes my comprehension. I think the public, at least the public I have heard from, has no misconception either of my ideas or motives. With an *illustration of a purely military* method of criticism, I will close a discussion long ago tiresome to all, and of no benefit to the cause or to individuals. It is a pity that an officer who is writing text-books for the army, and who hopes they will circulate abroad, does not take ordinary care to see that they are free from flagrant and ludicrous errors.

In Plate IX. of Wagner's "Security and Information," 1893, upper right hand corner, we see the unusual sight of a contour stopped in its mad career by a night picket. The Major does not give us in the text any decision as to the duty of the picket when confronted by so grave a situation. It has held the contour for some years, and, like the man in the bear story, it does not dare to loose its hold. There is no scale on the map, and we cannot tell how near help is.

Officers about to be examined want a decision *as to what a sentinel at a picket should do with a red contour between retreat and reveillè.*

Apparently we all make errors, in maps, and other things. I admit mine cheerfully, with the hope that they will be forgiven at the final settlement. I have no intention of engaging in any discussion with any one upon the various methods and ideas proposed in the essay. Those who want to find some good in it can probably do so, those animated by different motives will be equally fortunate. I have written this with reluctance, and simply because I desire to remove every particle of ground upon which personalities can be built. I thought I had accomplished that feat in the essay, but it seems I was mistaken. There are two good old aphorisms worth remembering. 1st. "People who live in glass houses should keep the panes frosted." 2d. "Courtesy among military men is indispensable to discipline."

## II.

### "The Lyceum at Fort Agawam."

First Lieut. Wm. E. Birkhimer, 3d Artillery.

WE have read with interest Captain Swift's remarks upon the Lyceum course at this celebrated post, but feel constrained to say that, tested by the facts, as from year to year they are unfolded, his narrative seems to be as clearly in the category of allegorical literature as Bunyan's "Pilgrim's Progress."

After reading the captain's paper, the inference seems fair that he never took part in that Lyceum, and that his knowledge of what took place there was derived from the rosyate imaginations of others. We have been stationed for years at Fort Agawam, and can correct some of the errors of fact regarding the manner of conducting the Lyceum there, into which the captain has fallen.

Well do we remember the day when the general order instituting the Lyceum course was received at the post. Expectation was on tiptoe. At last a ready means had been devised for keeping the army professionally abreast of the times. How carefully every paragraph was scanned. The rock of military knowledge was struck, and streams of wisdom were perennially to gush forth.

Everyone appreciated the opportunity now afforded him of writing an essay, otherwise styled a "report," of which a full discussion was to be encouraged. What opportunities did this not open; at last a chance was given to get even with the post commander. And right royally was it embraced! Well do we recall the thinly concealed yet point-

edly directed thrust at that ill-fated official, who, in the discharge of his duty, had run counter to the views or vagaries of the "reporting" subordinate. It mattered not that fair minded men deprecated this covert species of attack; the opportunity was given to at once ventilate and redress a grievance under the guise of the performance of official duty, and the most was to be made of it. The path of Christian, as Bunyan describes it, was through Elysium strewn with roses compared with that the post commander now had to tread.

Nevertheless, these attacks looked far-fetched and strained. For some years the commanding officer at Fort Agawam contented himself with simply presiding at the Lyceum. And, to thus attack a man who really had no recognized way of defending himself against assault, felt but yet not seen, to say the least appeared to be in bad taste. At last, however, glorious day for the kicker! the commanding officer of Fort Agawam was informed that he, and not only he but all the field-officers of the line must also write essays or "reports." In vain he pointed out that there would be an incongruity in his writing a paper for his subordinates to discuss. It availed not that he expressed the belief that the only thought the subordinate should give to an official paper written by his commander was implicitly to obey, and never to discuss it. And, as regarded the field-officers, he pointed out that the terms of the order, properly construed, never could have intended that they should make these so-called reports; for, as the latter may be placed before the examining boards when the writer is up for promotion, and as these officers are not subjected to such examination, this language of the Lyceum order would, as to field officers' "reports," be senseless. From all this the faithful veteran commanding at Fort Agawam argued that it never could have been contemplated that either he or his field-officers should make "reports"; but, in pursuance of the customs of several years, and the language of the order that they should officiate only as President and assistant instructors, respectively.

Alas, for the discipline at Fort Agawam, these representations had no effect other than the more surely to confirm the newly discovered interpretation of the Lyceum order. "Reports" from the commanding officer and the field-officers' were the order of the day. Moreover, as their "full discussion was to be encouraged" free rein was at last given to that species of criticism before adverted to. Covered up it was, indeed, under a thin veneering of professed official duty, yet so plainly intended that the most superficial observer could not but discern infallibly the meaning.

The feature of the Lyceum at Fort Agawam which, next to the commanding officer's disciplinary attribute, most conspicuously attracted attention, was the arrangement in the order of sequence of these "reports." The theory upon which the Lyceum superstructure was built was that valuable professional information thereby should be first collected and then disseminated. Naturally, in such a case, the older and more experienced officers would come to the fore; they would be natural leaders in such a cause. How different and disappointing the fact. With a modesty that for once is *not* worthy of all praise, the veterans shrank into the back ground, leaving to their juniors, the mere youngsters of yesterday, and to-day, the duty of the fighting line and supports, while the seniors constituted the reserve far in the rear. Upon the former devolved the brunt of the fight, while, when possible, the latter got out of it altogether.

Such are some of the incidents connected with the Lyceum at Fort Agawam. A well-founded, although perhaps an erroneous impression has grown out of it all, that such institutions, grand and beneficent as may have been their conception, have not in full fruition met the anticipations of their projectors and patrons. In the army, it is believed, no more than elsewhere, does the maxim "put the work on the other fellow" lead to professional excellence.



# Reviews and Exchanges.

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## Cavalry vs. Infantry, and Other Essays.\*

THIS volume, edited by Major Wagner, forms the fourth one of the International Series, published by the Hudson-Kimberley Co.

Captain Maude needs no introduction to American officers, and his writings are probably read quite as extensively, relatively considered, in the United States as in England. In a recent preface thanking the editor of *Journal of the U. S. Cavalry Association*, for certain courtesies, Capt. Maude expresses himself in the following kindly words; "I trust my readers will see in this courteous act a fresh evidence of the kindly spirit of comradeship in arms which has always existed, and I hope will ever continue to unite the officers of both armies, and which is so well expressed in Admiral Tatnall's saying, 'Blood is thicker than water.'"

The work consists of the following essays: Cavalry versus Infantry in the Napoleonic Era; Short Service and Discipline; The Napoleonic Conscription; The Old Peninsular Army; The Home Army; The Wars of Frederick the Great; Tactics of Opposing Forces before the First Silesian War; Seydlitz and the Prussian Cavalry; General Marbot's Memoirs; Attack or Defense; The Prussian Cavalry in 1815; General Von der Marwitz's Second Cavalry Pamphlet; The Berlin-Vienna Race; General Von Rosenberg's Hints on Recruit Training and Riding.

If there is one thing that stands out prominently through the work, it is the writer's earnest belief in the axiom, expressed in the opening lines: "The tactics of an army should be based on the racial characteristics of the men who compose it." He does not believe that the same rules are to be applied to all cavalry forces; nor to all infantry forces. The cavalry of some nations may be so excellent as to successfully charge unshaken infantry; and the infantry of some nations may be so firm as to annihilate charging cavalry. But whether the charge be successful or not, cavalry must still *be prepared* to charge unshaken infantry, for, until the experiment is tried, success is uncertain; *Pour faire une omelette, il faut casser des œufs.*

The effect of the Napoleonic wars upon Continental ideas of the cavalry charge, was that cavalry could not charge unshaken infantry. And this, Captain Maude points out, was due to the excellence of the British infantry, and the corresponding inferiority of Napoleon's cavalry who, strange to say, charged only at the trot. But British cavalry *did* charge unshaken infantry successfully, and numerous cases are cited during the Peninsular War, where it occurred. But after Waterloo, where the inferior French cavalry signally failed, French ideas were generally accepted,—even the Germans forgetting how Seydlitz charged unshaken infantry at Roszbach, and defeated it; and likewise at Lomdorf, where he twice turned the scale with his cavalry charges.

In a number of his Essays, Captain Maude attacks the English long service system. He states that with seven years term of service in the British army, the British soldier does not compare in discipline and smartness with the German. During the German term of

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\**Cavalry vs. Infantry, and Other Essays.* By Captain F. N. Maude, R. E. Hudson-Kimberly Publishing Co., Kansas City, Mo.

less than three years with the colors, wonders are performed. And yet, Captain Maude says, though the German system has produced soldiers capable of fighting their own weight of Frenchmen, they fall short in many ways of the English standard of what soldiers should be. With the relatively greater term of service in the British army, with more intelligent recruits, and with greater individuality among its members, he believes the English army should excel. For he calls attention to the fact that Anglo-Saxon soldiers are the best fighters in the world, and are most efficient when thrown on their own resources; while in Germany the reverse holds good. He states too, that the keystone of German organization is in subdivision of work, and delegation of responsibility, to which we will agree. But his statement that Germans of brains do not, as a rule, reëngage, and that those who are left are afraid of responsibility, must, we think, be accepted with misgivings, unless he means it to apply merely to the private soldiers. However, as compared with Anglo-Saxon soldiers we think the statement well taken. The Germans train the will of the soldier: the Anglo-Saxon trains the mind, and encourages individuality.

Captain Maude states, too, with just a touch of sarcasm, that the Germans teach their men *how to die*; the English teach, *how to avoid dying*. And considering the English character, he points out that the idea of *infliction* of loss, and *not avoidance* of loss, should apply better to English troops than to all others. He criticises too, the fact that some regimental commanders in the British army force their favorite non-commissioned officers upon the captains; while the German captain has absolute independence in the selection, —though often hampered by the lack of intelligence of the material which, within the allotted time, must be hammered into shape for the inspecting officer. He remarks that, if promotion to field-officer in the British army, depended on smartness or efficiency of the company, as judged by a board of officers, and not upon book learning, there would be greater improvement.

In his sketch of the old Peninsular army, he further carries his criticism of the British army of to-day, by the deduction that if the old army, with imperfect organization, inefficient staff, with felons in the ranks and adventurers among the officers, could accomplish such results in spite of discouragements at home, how much more could a modern British army accomplish, if it were trained, as was the old army, to know *how to die*.

Throughout all his essays, touching the present army, Captain Maude deprecates the long service term of enlistment, and the over-centralization of power in the colonel and adjutants, as tending to stereotyped forms and customs, decay of military knowledge, idleness and *ennui* among the officers, and practical divorce from their men. He states that squadron commanders do not, under the present system, learn how to lead their squadrons, and are robbed of incentive to exertion.

His sketch of General Marbot's Memoirs calls attention to one of the most intensely interesting works of modern times. The book is like a novel, and Marbot a veritable Monte Cristo. Besides touching upon the general interest of the work, Captain Maude points out that, according to General Marbot's account, corroborated by others, the statements heretofore made as to the losses and the cold, suffered during the retreat from Moscow, were much exaggerated. He ascribes the whole disaster to lack of discipline more than to any other one thing; and this, in turn, he traces, to the system of centralization of military power, introduced and encouraged by Napoleon himself.

The essay on "Attack and Defense" contains Captain Maude's well known views on the superior efficacy of the attack as compared with the defense. In case of the invasion of England, he favors aggressive attack of the invaders, as giving better opportunity for the use of the individual fighting power of the English soldier; and he moreover believes that the abundant cover and numerous villages add to, rather than detract from, the advantages of the attack.

General Marwitz's pamphlet on "The Prussian Cavalry in 1815," written in justification of Blücher's criticism as to cowardice on the part of the cavalry, contains an interesting discussion of the moral and physical requisites which go to make up efficient cavalry. The moral element, says he, comprise personal courage and *esprit de corps*; the physical, —horsemanship, and soundness and proper condition in horse and rider,—besides mobility and precision in field movements. *Esprit de corps*, General Marwitz says, raises the courage of the individual, through the confidence he feels in his comrades, and the dread of ridicule. The sense of honor and of shame which the whole mass feels when *esprit de corps* exists, is calculated to raise the moral standard of the individuals. The officers are the pillars upon which *esprit de corps* rests, and to perpetuate it the officers must be relatively numerous, and belong for a considerable time to their regiments; for regimental tradition, says he, is almost synonymous with *esprit de corps*.

In concluding the discussion, General Marwitz shows how wanting in both the moral and physical qualities which make good cavalymen was the Prussian cavalry of that day. Although individually courageous and zealous, the men could not ride, and the horses were either untrained or broken down.

The United States cavalry almost invariably take the field at present, equipped with leggings in place of boots. In fact, they derive no small part of their value as both mounted and dismounted troops, to not being impeded with cumbrous boots. And yet General Marwitz, an experienced cavalry officer of the old school, makes a significant statement, which causes thought: "We must also reintroduce the long, stiff jack-boot; for without them, no man could endure the pressure in a charge."

General Marwitz's second pamphlet contains a laughable account of the scolding the Great Frederick gave his cavalry officers, who had evidently become very lax in their duties. Among other things: "Then, when the season for riding drills comes on, the captain sends for the sergeant-major and says: 'I have an appointment this morning at so-and-so, and must get away early; tell the first lieutenant to take the rides.' So the sergeant-major goes to the first lieutenant and gives him the message, and the latter says: 'What! the captain is away? then I am off hunting; tell the second lieutenant to take the men.' And the second lieutenant, who is probably still in his bed, says: 'What! both of them gone? then I will stay where I am; I was up till three this morning at a dance; tell the cornet I am ill, and he must take the ride.' And the cornet says: 'Look here, sergeant-major, what is the good of my standing out here in the cold? You know all about it much better than I do; you go and take the ride.' And so it goes on; and what must be the end of it all? What can I do with such cavalry before the enemy? I tell you, I think so much of the importance of your arm, that I expect more from a lieutenant of cavalry than from a major of infantry. \* \* \*"

The account of the Berlin-Vienna long-distance race brings to mind some long-distance riding by our own cavalry. Lieutenant von Reitzenstein, the winner on the German side, completed 388 miles in 73 hours, 6 minutes. This included all stops. The rider was handicapped by poor maps, causing him to lose the way; but was assisted by a bicycle rider who rode ahead and prepared forage. The horse rested only eight hours, and was fed only twice with about 14 lbs. of oats each time; but had oatmeal gruel as often as it could be conveniently given. The horse, a thoroughbred English hunter, a mare ten years old, died the day following the conclusion of the race.

The work is a valuable addition to military literature, and is naturally of especial interest to cavalry officers, whether they agree with all of Captain Maude's views or not. The essays were originally published in the *Civil and Military Gazette*, of Lahore, India, and were thus directly addressed to the Indian army. The duties of the cavalry upon the frontier of India are said to be not dissimilar to those of our own cavalry, so

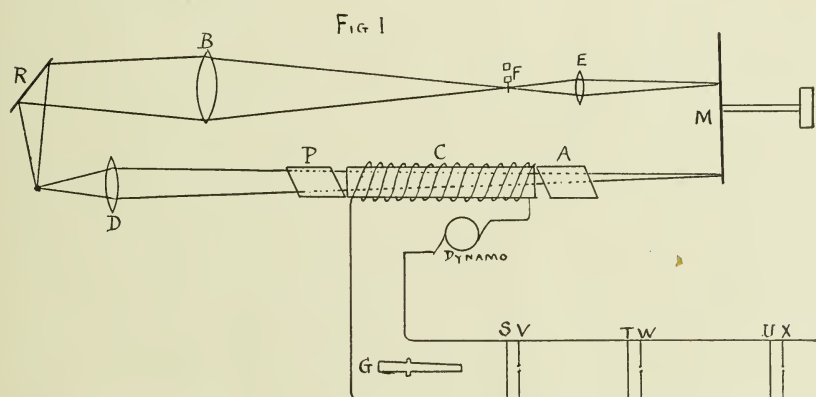
that, in addition to the fact that we have many of the "racial characteristics" of the British soldier, these essays should have a peculiar interest for our cavalry.

CHARLES D. RHODES,  
1st Lieutenant, 6th Cavalry.

### The Polarizing Photo Chronograph at the U. S. Artillery School.

Descriptions of the above instrument and the experiments made with it are the subjects of articles in the *Journal of the U. S. Artillery* for July 1895, May-June 1896, and Nov.-Dec. 1896, by the inventors, Dr. A. C. Crehore of Dartmouth College, and Dr. George O. Squier, 1st Lieutenant, 3d Artillery, Instructor in the Dept. of Electricity, etc., U. S. Artillery School. The instrument as first used and described was to some extent improvised, the last paper being devoted to a description of the new and complete instrument now at the school.

As a velocimeter the instrument possesses many new and meritorious features, giving a clear, photographic, simultaneous record of minute intervals of time, and a time scale. The principle upon which this photographic time recording rests is that if a beam of light falls upon a sensitive plate rotating on an axis at right angles to its plane, and the beam is interrupted by a shutter at the desired instants, the interruptions in the ring darkened by the action of the light will correspond to these instants; and if by any means there is simultaneously photographed some scale by which time can be measured the *intervals* between these instants are known.



Heretofore great trouble has been experienced in moving the shutter uniformly, as inertia, even in the lightest shutter, would introduce serious errors when moved with the extreme quickness required. The inventors obviate this by doing away with a mechanical shutter and taking advantage of the following property of polarized light: If a beam of polarized light passes through a tube filled with some transparent medium, as bisulphide of carbon, surrounded by a coil of wire through which a current flows, the plane of polarization will be turned, or its azimuth changed a certain amount, depending upon the strength of the magnetic field produced by the current. If the beam then meets a Nicol prism it will pass through it or be stopped, depending upon the angle through which the prism has been turned upon its axis. If the prism be so turned as to arrest the beam, and the current then interrupted, the resulting change in azimuth of the plane of polarization will allow the light to again pass through the prism and affect the sensitive plate. Instead of moving a shutter, the same effect is produced without having to move any *mass*. The diagram (Fig. 1) shows the relation of the essential parts.



P and A are respectively the polarizer and analyzer (Nicol prisms). The tube C between them is filled with bisulphide of carbon and wrapped around with the coils. The arc lamp L supplies the light, which is concentrated by lens D, polarized by P passing through C, and arrested by A until the plane of polarization is turned due to current being broken in coil, when it passes through and strikes sensitive rotating plate M. At the same time a mirror R reflects a beam through lens B, through a small hole in a little metal plate attached to the prong of the turning fork F, then through lens E to revolving plate. As the plate revolves the lower beam would, if not arrested, trace a circle on it, while the upper beam from fork would, when fork is vibrating, trace a sinuous circular path, each wave corresponding to one vibration of the fork. Since the number of vibrations per second of the fork can be found with accuracy, its trace on the plate will constitute a time scale. When the current in coil is momentarily interrupted the light passes through A and a record is made at that instant by the light striking the sensitive plate. The current is automatically restored and the next momentary break is similarly registered. The number of waves marked by the fork between the sharply defined beginnings of each record would be the measure of the intervals of time. If these momentary interruptions are made by a projectile from the piece G rupturing the circuit at wire screens S, T, V successively, if we know the distances of the screens apart, the velocity is known. Simple circuit closers V, W, X close the circuit in each case immediately after the screen is ruptured, and before the projectile reaches the next screen.

To prevent the light from remaining turned on and causing a blur of previous indications as plate continued revolving, a "gravity switch" is used, in which contacts are arranged, so that as a weight is dropped it will fire the piece and operate a sliding shutter in which the slot is of just sufficient width to give desired exposure. The plate is rotated at a high and uniform speed by means of an electric motor.

The instrument was used to determine interior velocities in the following way: A 3."2 field-gun is fitted with a wooden collar held on with rings. A metal ring is supported by metallic supports. A wooden rod fitted with copper bands flush with its surface is set in the end of the projectile, and the bands and projectile are connected by an embedded wire. When the piece is fired the rod slips through the ring, and the bands would make and break the circuit through the wires. These intervals of time are recorded on the revolving plate as above described, and give the data for calculating the velocity of the projectile at different points along the bore, without the necessity of mutilating the piece. The minute intervals of time measured in this case show the capability of the instrument. It is said that some of the intervals were less than  $\frac{5}{10000}$  of a second. In the complete instrument now installed at Ft. Monroe, described in Nov. and Dec., 1896, number of the *Journal of the U. S. Artillery*, many improvements in the details are noted. A very perfect instrument for measuring the angles with a high degree of accuracy is described.

In summing up the advantages claimed for this chronograph, the following may be mentioned: 1st. Since there is no iron in the coil C, there is no appreciable "magnetic lag." 2d. No *pairs* of electro-magnets are used whose variation in action from time to time would introduce serious errors. 3d. Measurements are not restricted to a *single* interval—several successive ones may be taken. Taking it altogether the inventors are to be congratulated upon having devised an instrument which is not only useful in practical ballistics, but also is sure to be an invaluable aid in the measurement of the minute intervals of time now so frequently required in many fields of physical research.

E. R.

## The Island of Cuba.\*

An authoritative work on this subject at this time should be received with favor and prove interesting, especially to military readers. Much has been written about Cuba, past and present, but it is impossible to find a book which gives as much useful information in a small space, unbiassed by personal preference and partisan feeling, as does the volume now under consideration. The scope of the work is well set forth in the preface: "The writers of the following pages had occasion recently, in connection with the discharge of official duties, to make some investigations relative to Cuba and its relations to the United States. In the arrangement of the work to be undertaken, the previous lines of investigation of the respective collaborators were kept in view, and the book was divided accordingly. The first part contains a detailed description of the physical conditions of the island; the second or historical part, narrates what has been done in this scene of action; the third part describes the present condition of the island from an administrative and commercial standpoint. As the primary object of the authors was to gain correct information and not to dress up a tale of woe or defend a party, they have endeavored to divest themselves of passion and prejudice, and to present the truth as nearly as they could find it.

Part I, descriptive, thoroughly covers all the ground in this respect, from Cape Maisi in the extreme east, to Cape San Antonio in the west. In length we find the island to be about 760 miles, in breadth it varies from 30 to 125 miles, making the area in the neighborhood of 45,000 square miles; about equal to that of the State of Pennsylvania. Politically the island is divided into six provinces, which, commencing at the eastern extremity are, Santiago de Cuba, Puerto Principe, Santa Clara, Matanzas, Habana and Pinar de Rio. In the text these provinces are taken in order and their physical features fully and minutely described. The mountains, water courses, plains, lakes, forests and coasts receive that careful attention which their importance in military operations merit and their interest to the general reader require. The communications are next carefully described. Wagon roads—their location, length and condition; railroads—location, length and companies operating them; steamers, coastwise and foreign, their routes, the companies operating them, and in some cases, the names of the steamers and their sailing days; cable and telegraph lines, and the telephone system of the city of Habana.

Alphabetical list of the cities and towns, their distances from the capital city of the province, their population as well as that of the township. The city of Habana receives particular attention as regards its construction, surroundings and defenses.

All of importance touching the climate and products of the island is fully set forth.

Lieutenant Rowan is the author of the descriptive sketch.

Professor Ramsey takes up the Historical, Political and Commercial divisions of the text.

Under the first heading he gives a very interesting *résumé* of the history of the island from the time of its discovery by Columbus during his first voyage. The effect of the iron and retarding hand of Spain is seen throughout the narrative. A good idea is given of the trocha, about which we hear so much: "There is a line of forts known as the trocha (*i. e.*, trench or traverse) across the island between the provinces of Puerto Principe and Santa Clara. Garrisons were placed in these, and the intervals were occupied by small detachments of troops. General Martinez de Campos had conceived the plan of this line of defense in a moment of inspiration during the previous ten years' war, which he had terminated successfully; and now occupying it again with 100,000 men at his command, he felt

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\* *The Island of Cuba*. A Descriptive and Historical Account of the "Great Antilla." By Andrew Summers Rowan, First Lieutenant 10th Infantry, U. S. Army, some time member of the Intercontinental Railway Survey, and Marathon Montrose Ramsey, B. S., A. M., Professor of Romance Languages in the Columbia University, Author of "A Text-Book of Modern Spanish." New York: Henry Holt and Company, 1896.

confident of being able to say, 'Hitherto shalt thou come, but no further.' Yet the insurgents under Gomez and Maceo were able to slip through, and return with captured arms and supplies, spreading havoc far and wide, and alarm still more widely. The idea of a trocha to fence out an enemy was still thought to be good in itself, but this one was adjudged to be too remote; so a second was drawn through Las Cruces and Las Lajos, skirting the great salt marsh of Lapata. When that proved equally ineffectual, General Martinez de Campos retreated in the direction of the capital, and constructed a third and shorter military line directly across the island from Matanzas to the bay of La Broa." He took his trocha with him. \* \* \* "Captain General Weyler \* \* \* has established a fourth trocha across the island from Majuna to Mariel, about twenty-five miles west of Habana. As this particular barrier is the one most in interest at present, it may be described more particularly. It consists of a ditch, as the name trocha would indicate, nine feet deep, containing water in the low places. On each bank is a wire fence, and on the east side is a beaten road, which is patrolled by cavalry and light artillery. Along the west bank are detached earthworks, guarded by troops and connected by telephone. The approaches to both sides are protected by rifle pits, about 70 feet apart, and screened by a line of *trous-de-loup*."

Interesting data in regard to the strength and composition of the Spanish and Cuban forces at present operating on the island are also given.

The political and commercial questions involved receive due consideration, and much important and interesting information can be gained from this part of the text.

The work closes with a bibliography of works on the island of Cuba.

To military men the book is all important.

FRANK H. EDMUNDS,

Captain First Infantry.

### Dickman Field Holder.

This "Field Holder," as it is called, consists of a detachable pad of blanks about  $5\frac{1}{2}$  by 8 inches, in a stiff oil-cloth holder, cover or case, containing a lead pencil and rubber eraser, this cover has an inside pocket and is held together when closed by an elastic band.

Its purpose is given in the instructions printed on the pocket as follows: "This blank is intended to be of use in a course of instruction of the company or troop in field duties; later, in connection with tactical exercises of the battalion or squadron and of larger mixed bodies; and eventually on actual service in the field in time of peace or war."

The blanks are folded like a sheet of note paper, making four pages; the first, or outside page is ruled in half-inch squares for sketching, nine one way, thirteen the other, this on a scale of six inches to the mile would cover over a mile, but as such a scale would require more details than the time would admit of, probably two or three inches to the mile would be nearer the usual scale; this would permit a sketch of two or three miles.

The fourth page consists of a blank report in about the general form recommended by the text-books on such subjects. The instructions in our books relative to such matters are to be concise, one even going so far as to state on orders: "If there is in an order a single word the omission of which would make no difference to the meaning, the order is too long." Yet here we have an address on the inside and again on the outside.

By folding these two outside pages so as to become the inside, the sketch and report are very conveniently brought face to face; the top and bottom being folded down nearly in thirds, one flap, top or bottom, can be inserted between the two leaves of the other end, leaving the middle fold for the address, a printed form is there for the purpose, with a place for times of departure and arrival, and speed.

In the instructions for the use of the holder the speed for the messengers is recommended to be given by crosses; while this might be better than nothing, as a rule our messengers can read, and memory is not always to be trusted, a written word is far better than a sign. There should be a receipt somewhere for the protection of the messenger; a little thought will bring to mind that some personal history might be different if receipts had been given for reports and orders received in our past wars.

On the whole it is a good effort in the right direction, better suited, however, to the mounted than the foot soldier, and no doubt improvements will suggest themselves upon practical use.

J. F.

### Special Report on Combined Manœuvres at the Cavalry and Light Artillery School—1896.

This interesting report treats only of the field exercises at Fort Riley, which close the annual curriculum of the School. A glance at the roster shows a decided departure from the conditions of previous years, and also calls to mind the iterated recommendations of the several commandants for changes in the details of organizations for service at the school, that all may in time receive equal benefit from the course of instruction. The departure is in the presence of infantry in the combined manœuvres, the new combination adding largely to the number of possible exercises, while the disparity in the strength of the different arms urges the commandant to suggest that the infantry be increased, during the period of manœuvres, from neighboring posts. The ice has been broken, certainly, by the presence of the Leavenworth troops, so we may hope for greater things in the future. Of the ten light batteries, but three have taken the course since the school began, although recent changes have added two others to this number.

Succession in the detail of the mounted organizations should enter into the plans for the interchange of troops and batteries and the retention of Battery F of the 4th Artillery seems somewhat unnecessary. The want of the complement of officers is noticed, particularly among the Leavenworth organizations. The remedy for this ought to be simple at a post where so many surplus officers are available.

There were, in all, ten exercises, held from October 14 to December 7, in the first six of which there participated twelve troops of cavalry, five companies of infantry and three batteries of light artillery; and the remaining four manœuvres were held by the garrison of Fort Riley alone. The exercises were as follows:

1. Pursuit of a detached force.
2. An attack on a reconnoitring force.
3. Seizure and defense of a bridge.
4. Defense of a railroad against a raid.
5. Attack on an outpost line.
6. Rear guard against advance guard—delay action.
7. Attack and defense of a defile.
8. Defense of river crossings against a reconnoitring force.
9. Use of a cavalry screen.
10. Forced march of concentration.

In preparation for each exercise, a day was allowed commanders for plans and a study of the ground, while following each manœuvre was a fair discussion of the points developed and of the decisions of umpires.

There were several faults which repeated criticism seem to fail in correcting:

(a) Unnecessary exposure of troops, particularly in cases of individual men, whose imaginations seemed unable to create an assumed danger under peace conditions; (b) wild racing of horses over broken ground; (c) retention of caissons in the immediate vicinity of the guns; (d) reckless charges in line on batteries in action; (e) refusal of men to surrender when well inside the rule limits; (f) want of range finders with batteries. Estimates of a certain range varied from 1500 to 2500 yards, the actual distance being 2300. It would seem hardly possible for umpires to decide correctly, at the moment, probable losses from artillery fire under such conditions.



These ten manœuvres were well worked out, and, except in three cases perhaps, seemed to have been most successful in developing the military principle involved. The reader of this report may note the care and exactness with which the preliminary orders are drawn up to insure the collision of the opposing forces at the right moment and on the ground selected by the director of manœuvres. The commandant calls attention to the need of field-glasses in the field equipment of officers, and one of the exercises aptly illustrates the danger from their absence. It would be well were they distinctly required by regulations.

The comment of the chief umpire, on page 22, seems somewhat bookish. After admitting the success of a commander's dispositions and ample justification for them, he elaborates a caution against abnormal formations. A commander who can recognize the inaptitude of the normal to the case in hand, and who has the courage to ignore it and the originality to meet successfully unexpected and unusual conditions for which no set of tactical rules can provide, has shown himself an exemplar of military attainments which should be the very aim of these practical field exercises.

Appendix B contains the rules for the government of the exercises. They are very thorough and leave little to be desired. It presents also a very full summary of the powers of the three arms and rules for the guidance of umpires.

H. L. H.

### The Travelers' R. R. Guide

(Formerly Appleton's) has introduced a novel arrangement of maps. Instead of the large sheet containing a map of the whole country, which was difficult to examine in the limited space of a railway seat, there are published a series of state maps of the size of the ordinary pages of the Guide, bound in the same manner as the other pages. The maps are corrected down to date and are complete as to details. Maps of the cities of New York, Philadelphia, Washington and Boston are also included. This convenient arrangement, which appears in each monthly issue of the Travelers' R. R. Guide, is an improvement which the public will recognize and appreciate, since nothing is of greater assistance in making up a route and time-table for a tour than a good map.

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# Prize Essay—1897.

I.—The following Resolution of Council is published for the information of all concerned :

*Resolved*, That a Prize of a Gold Medal, together with \$100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and \$50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September 1, 1897*. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.
3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.

In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may ecommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1896, for the Prize Essay of 1897, is

"BASED ON PRESENT CONDITIONS AND PAST EXPERIENCES, HOW SHOULD OUR VOLUNTEER ARMIES BE RAISED, ORGANIZED, TRAINED AND MOBILIZED FOR FUTURE WARS."

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1897 are :

GENERAL WESLEY MERRITT,  
GOVERNOR U. A. WOODBURY,  
COLONEL H. W. CLOSSON.

JAMES FORNANCE,  
*Secretary.*

GOVERNOR'S ISLAND,  
Nov. 1, 1896.









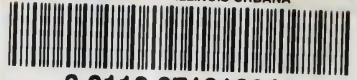








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